















# THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME X

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## KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

<b>ā</b>	as in ale, fate.	<b>ch</b>	as in chair, cheese.
<b>ā</b>	" " senate, chaotic.	<b>d</b>	" " Spanish Almodovar, pulgada, where it is nearly like <i>th</i> in English then.
<b>ā</b>	" " glare, care, and as <i>e</i> in there.	<b>g</b>	" " go, get.
<b>ā</b>	" " am, at.	<b>g</b>	" " German Landtag = <i>ch</i> in Ger. ach, etc.
<b>ā</b>	" " arm, father.	<b>h</b>	" <i>j</i> in Spanish Jijona, <i>g</i> in Spanish gila; like English <i>h</i> in hue, but stronger.
<b>ā</b>	" " ant, and final <i>a</i> in America, armada, etc.	<b>hw</b>	" <i>wh</i> in which.
<b>α</b>	" " final, regal, pleasant.	<b>k</b>	" <i>ch</i> in German ich, Albrecht = <i>g</i> in German Arensburg, Mecklenburg, etc.
<b>α</b>	" " all, fall.	<b>ŋ</b>	" " in sinker, longer.
<b>ē</b>	" " eve.	<b>ng</b>	" " sing, long.
<b>ē</b>	" " elate, evade.	<b>n</b>	" " French bon, Bourbon, and <i>m</i> in the French Etampes; here it indicates nasalizing of the preceding vowel.
<b>ē</b>	" " end, pet.	<b>sh</b>	" " shine, shut.
<b>ē</b>	" " fern, her, and as <i>i</i> in sir, etc.	<b>th</b>	" " thrust, thin.
<b>e</b>	" " agency, judgment.	<b>th</b>	" " then, this.
<b>i</b>	" " ice, quiet.	<b>zh</b>	" <i>z</i> in azure, and <i>s</i> in pleasure.
<b>i</b>	" " quiescent.		
<b>i</b>	" " ill, fit.		
<b>ō</b>	" " old, sober.		
<b>ō</b>	" " obey, sobriety.		
<b>ō</b>	" " orb, nor.		
<b>ō</b>	" " odd, forest, not.		
<b>o</b>	" " atom, carol.		
<b>oi</b>	" " oil, boil.		
<b>ōō</b>	" " food, fool, and as <i>u</i> in rude, rule.		
<b>ou</b>	" " house, mouse.		
<b>ū</b>	" " use, mule.		
<b>ū</b>	" " unite.		
<b>ū</b>	" " cut, but.		
<b>u</b>	" " full, put, or as <i>oo</i> in foot, book.		
<b>ū</b>	" " urn, burn.		
<b>y</b>	" " yet, yield.		
<b>β</b>	" " Spanish Habana, Córdoba, where it is like English <i>v</i> but made with the lips alone.		

An apostrophe ['] is sometimes used as in *tā'b'l* (table), *kāz'm* (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as *g*, *h*, *k*, *n*, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.



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Mr. David Hale Newland.

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# THE NEW INTERNATIONAL ENCYCLOPÆDIA

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**GLACIAL** (glă'shal) **DRIFT.** See **DRIFT.**

**GLACIAL PERIOD, PLEISTOCENE** (plis'to-sēn) **PERIOD, or ICE AGE.** A division of geologic time, comprising the earliest part of the Quaternary period. The term gains its significance from a remarkable episode in which abnormal conditions of climate were involved. In late Tertiary times there seems to have been a gradual lowering of temperatures throughout the north temperate zone, and this change progressed steadily until at the opening of the Glacial period the climate was essentially arctic. Within the continental areas enormous glaciers and ice sheets then formed, which advanced southward, filling the river and lake basins, covering the mountains, and burying the lowlands beneath a vast *mer de glace*. One field of ice extended over Canada and the northeastern part of the United States. Its northern limits have not yet been defined, but on the east it reached the Atlantic Ocean, and southward it advanced well into New Jersey, Pennsylvania, and the States between the Ohio and Missouri rivers. New England, New York, and the region of the Great Lakes were completely covered by the ice sheet. In the White Mountains the rocks bear evidence of having been striated and polished almost to the summits of the highest elevations, and the same phenomena have been recorded for the Adirondacks and Catskills, showing that the ice in places was several thousand feet thick. The mountains of western North America were also the scenes of great glacial activity, of which the snow fields of the present day are but wasted relics. Glaciers descended from the Rocky Mountains of Colorado and from the Sierra Nevadas of California far into the river valleys, while those of Alaska and British Columbia were so extensive as to form practically a single field.

The change in temperature seems to have been no less marked in the Old than in the New World. An ice sheet covered the whole of northern Europe; it filled up the basin of the Baltic on its way from Scandinavia to the plains of north Germany, and it crossed the North Sea to the Scottish Highlands, whence it moved northward and westward into the Atlantic. The whole of England north of the Thames, as well as Scotland and Ireland, was buried beneath the ice, which attained a thickness in some locali-

ties of 5000 feet. On the Continent the sheet spread over Scandinavia, Denmark, Holland, and parts of Germany, Belgium, and Russia, and comprised an area of about 800,000 square miles, or several times larger than the Greenland ice cap. South of its limits there were smaller snow fields and glaciers in the Carpathians, Alps, Jura, Pyrenees, and the Central Plateau of France. The present Alpine glaciers are shrunken remnants of the field that covered Switzerland during this period. The high mountain systems of Asia also show evidence of having been glaciated. In the Southern Hemisphere the glaciers of Patagonia were once enlarged so as to extend across the peninsula to the Atlantic shores, and New Zealand was overrun by the ice; but it has not been definitely established that the period of glaciation here was contemporaneous with that of the Northern Hemisphere.

**Effects of Glaciation.** The general configuration of continental lands has not changed appreciably since the opening of the Glacial period. The mountain systems had acquired their elevation before that time, and in a general way the drainage was directed towards the same channels that now carry the surface waters seaward. The ice exerted a powerful influence, however, upon minor land forms or types of scenery. In its progress from north to south and from highland to lowland it pushed along the soil and disintegrated rock, the accumulations of long periods of subaërial decay, and deposited them in great moraines, which still give a peculiar aspect to the scenery of glaciated regions. At the same time the sand and stones incorporated in the mass of moving ice were efficient agents of erosion; rock surfaces, wherever exposed, were smoothed and striated, prominences assumed a more rounded form, and the valleys were widened and deepened. The rock striations show that the direction of flow was influenced by mountain ranges of considerable elevation, although small inequalities in the surface caused no deviation. Most of the lakes in northern Europe and America had their origin in this period. Lake basins were scooped out by erosion, and temporary lakes were formed by obstruction of valleys during the retreat of the ice sheet. One of the largest temporary basins, which has been surveyed by means of the old beach lines, extended from the northern parts of Minnesota and North Dakota far into Canada, and covered an area exceeding that of

all the Great Lakes combined. All lakes which are of preglacial origin show evidence of having been expanded during this period. The Great Lakes are bordered by a succession of terraces, the highest of which stand nearly 500 feet above the present water level. The ice sheet for a time stretched across the St. Lawrence valley, turning the drainage of Lake Ontario into the Mohawk and Hudson; and Lake Michigan, obstructed at its outlet, overflowed towards the southwest into the Illinois River.

A further important result wrought during the Glacial period was the removal of the soil that had been derived in situ by weathering and the substitution of a covering of "drift" (q.v.). This glacial material was spread very unevenly over the land. In the Laurentian highlands of Canada, where the ice sheet formed, the surface is bare rock or at most thinly covered with soil. Farther south the drift accumulated along lines marking the advance and retreat of the ice in great heaps of boulders, gravel, sand, and clay. Such terminal moraines are strongly developed in New England, New York, Ohio, and the Northern States as far west as Kansas. A second portion of the transported material was distributed beneath the ice sheet as "boulder clay" (see BOULDER CLAY) or "till," in the form of a ground moraine. The boulder clay is a compact, tenacious clay containing boulders of varying size and generally unstratified, although traces of bedding are sometimes present. It rests directly upon the rock, which is usually smooth and striated. The boulder clay is distributed unevenly, gathering into smoothly arched ridges and mounds called "eskers" and "drumlins" (qq.v.), and at times thinning out so as to leave the rock formations exposed.

The extraordinary changes of climate indicated by the Glacial period led to migrations of the fauna and flora inhabiting the Arctic and temperate zones. As the temperature fell, such animals as were unable to endure extreme cold worked southward, while some species found their way from the far north into regions from which they have long since disappeared; remains of the polar bear, reindeer, and Arctic fox occur in the glacial deposits of southern Europe. With the retreat of the ice the Arctic fauna and flora were able to adjust themselves to the changing conditions by withdrawing from southern latitudes or by ascending the slopes of mountains. The oscillation of the climate was thus accompanied by a variation of the life forms in each particular region.

**Divisions of the Glacial Period.** A detailed study of the glacial deposits shows that they were not laid down continuously or under uniform conditions. On the other hand, the deposits are frequently divided into sections by intercalated beds of peat, and by variations in the relative degree of weathering which lead to the assumption that the ice advanced and retreated more than once. The evidences as to the number and extent of such fluctuations have not, as yet, been correlated successfully for different regions, and there is still much difference of opinion on the subject. The glacial deposits of the interior of North America are divided, according to the more recent views of geologists, into four and possibly six stages, each of which represents a period of glacial advance, with intervals of ice recession between each member. The stages are not all present in any one place, and they probably denote widely variant

periods of time, the earlier being the longer. Beginning with the oldest, they are: (1) Jerseyan, (2) Kansan, (3) Illinoian, (4) Wisconsin. The presence of two other stages—the one (Iowan) preceding and the other (Later Wisconsin) following the Wisconsin—is advocated by some authorities.

**Estimates of Time.** The Glacial invasion was the last important geological event preceding the present epoch that exerted a wide influence upon the physical features of the earth. Just how long ago it occurred cannot be stated, but estimates based on different data seem to indicate that the ice retreated from the northern United States at least 25,000 years ago. The time diminishes, of course, with increasing latitude and in Sweden it is calculated that the ice extended over the southern part as late as 12,000 years ago. The duration of the entire period from the first advance of the ice could not have been much less than 500,000 years and may have been two or three times that figure. It is certain that man existed during the later stages.

**Causes of Glacial Climate.** Various theories have been proposed to account for the cold climate of the Glacial period. A sufficient cause may be found in terrestrial changes, such, e.g., as would lead to a variation in the distribution of land and water. The formation of glaciers is influenced by precipitation and thus by the proximity of warm waters to areas of cold land. It is conceivable that the poles may have been surrounded by a large land area which would exert a cooling effect upon the climate, and that the flow of ocean currents may have been so directed as to increase precipitation, but such a view is unsupported by geological evidence. A second theory, based upon terrestrial changes, ascribes the cold climate to a general elevation of the land surface in the north temperate zone, possibly accompanied by a diversion of the Gulf Stream across the present Isthmus of Central America into the Pacific. This theory fails in the same particular as the first, i.e., there are no evidences of such great vicissitudes. While either of these theories would account for the cold, it is also difficult to bring them into consonance with the view now commonly accepted by geologists, that the Glacial period was marked by periodical variations in the climate. One of the most ingenious explanations that have yet been proposed is based upon the relative positions of the earth and sun at distant periods of time. It is known that the eccentricity of the earth's orbit is subject to secular variations. With a maximum of eccentricity the earth is 14,000,000 miles nearer the sun during perihelion than in aphelion, and the difference in the amount of direct heat received from the sun between these positions is about one-fifth. If now, by precession of the equinoxes, winter in the Northern Hemisphere should occur when the earth is in aphelion, the effect would be to lengthen this season by 22 days and to shorten the summer by an equal period. This coincidence of maximum eccentricity with aphelion winter would perhaps result in the refrigeration of the climate in the Northern Hemisphere. This theory, developed by Dr. James Croll, gained considerable favor for a time, but like the other theories is not without its defects. The most serious objection to its application is that it apparently limits the duration of the glacial stage to the precessional period of

21,000 years, altogether too brief for the results accomplished by the ice. More recently the trend of opinion has rather favored the influence of atmospheric agencies, such as those of the winds, the relative variations of moisture and of carbonic-acid gas in the air. No single explanation yet advanced seems to meet all the conditions of the problem, and it appears quite probable that the real cause of the Glacial period may lie in a concurrence of several different factors.

**Bibliography.** Geikie, *Great Ice Age and its Relation to the Antiquity of Man* (New York, 1895); Bonney, *Ice Work Present and Past* (ib., 1896); Herrmann, *Glacialerscheinungen in der geologischen Vergangenheit* (Hamburg, 1896); Wright, *Ice Age in North America* (New York, 1891); Dawson, *Canadian Ice Age* (ib., 1894); Lewis, *Papers and Notes on the Glacial Geology of Great Britain and Ireland* (London, 1894); Heim and Penck, *On the District of the Ancient Glaciers of the Isar and Linth* (ib., 1886); Lyell, *Geological Evidence of the Antiquity of Man* (4th ed., ib., 1873); Croll, *Climate and Time* (Edinburgh, 1885); Penck and Brückner, *Die Alpen im Eiszeitalter* (Leipzig, 1901-09); Leverett, "Glacial Formations and Drainage Features of the Erie and Ohio Basins," in *United States Geological Survey, Monograph XLI* (Washington, 1902); Fairchild, "Pleistocene Geology of New York State," in *Bulletin of the Geological Society of America*, vol. xxiv (ib., 1913). See GEOLOGY; GLACIER; PLEISTOCENE PERIOD.

**GLACIER**, glä'shēr or gläs'ī-ēr (Fr., from *glace*, Lat. *glacies*, ice). Many valleys of the Alps and of other high mountain ranges are filled with ice which extends from the snow fields above to well below the tree line. This mass of ice is called a glacier. The winter's snow, falling on the lower part of the glacier, melts away the following summer and exposes the ice, which also melts to some extent, and which, if there were not some source of supply, would entirely disappear. In the snow fields above, the annual snowfall is not all melted in summer, and there is an accumulation of snow. It is evident that in time the snow would grow indefinitely high if there were no means of relief. The necessary relief is found in the flow of the ice, which carries off the surplus snowfall of the snow fields, consolidated into ice, to the lower part of the glacier. A glacier, therefore, has two distinct parts—a *reservoir*, where the snow is collected, and a *dissipator*, where the ice is melted. The line separating these two regions is usually called the *névé* line. We are thus led to the following definition: A glacier is a body of ice and snow formed in a region where the snowfall is greater than the waste, and flowing to a region where the waste is greater than the snowfall.

**Distribution.** Whenever there is an annual snowfall greater than the annual waste, glaciers must exist. We find them on all high mountains subject to moist winds, such as those on the western coast of North and South America, the Scandinavian mountains, the Alps, the Pyrenees, the Caucasus, the Himalayas, and the mountain chains to the north, and the New Zealand Alps. One glacier is known in Mexico, on Mount Iztaccihuatl, and a number in equatorial Africa, on Mount Kenia, on Mount Kilimanjaro, and on the Ruwenzori Range. In the Arctic regions Grinnell Land, Greenland, Iceland, Jan

Mayen Land, Spitzbergen, and Franz Josef Land are more or less covered with glacial ice; and the Antarctic lands are almost entirely ice-covered.

**Classification.** Glaciers may be divided into the following classes:

1. Continental glaciers, or inland ice, such as the great masses of ice that cover Greenland and the Antarctic Continent.
2. Plateau glaciers, or local ice caps, similar to continental glaciers, but of comparatively small extent. Examples of this class are found in Norway, in Spitzbergen, and on the borders of Greenland.
3. Alpine glaciers, the more familiar forms, which occupy valleys.
4. Piedmont glaciers. This form occurs when Alpine glaciers debouch and spread out on a plain. The best example is the Malaspina Glacier, at the foot of the St. Elias Alps in Alaska.
5. Hanging glaciers, which rest on shelves on the mountain side. They are usually small and steep.
6. Débris glaciers (*glaciers remaniés* of the French), formed not from snow, but from ice falling from a higher glacier. They are usually small and unimportant.

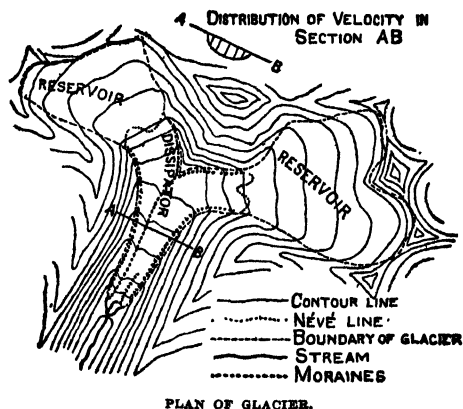
Glaciers may be complete or incomplete. A complete glacier has a reservoir where the snow is accumulated and a dissipator where the ice is all melted; an incomplete glacier either has its ice supplied directly, as in class 6, or loses some of its ice at the lower end by breakage, as in glaciers which break off at a cliff, or those which reach the sea and form icebergs.

**Motion.** If a glacier is in equilibrium—i.e., neither growing larger nor smaller—the ice annually flowing through any cross section of the glacier must exactly equal the total annual accumulation above and the waste below that section. As the accumulation above and the waste below a section through the *névé* line is greater than for any other section, the flow, under uniform conditions, is the greatest there; and it is less and less through sections more and more distant from the *névé* line, whether they are higher in the reservoir or lower in the dissipator.

That the ice of glaciers is in motion down the valley has long been known, both from the observation that large stones are carried down on the surface of the ice and from the general reasoning given above. It was not, however, until Agassiz and Forbes began their classical researches that any quantitative value of the motion of the ice was obtained. Since then many measurements have been made on various glaciers, and we now have a fair knowledge of this matter. It has been found that at any section the velocity of the ice is greatest at the centre and diminishes as we approach the sides. When, however, a glacier has a sinuous course, the greatest velocity is not in the exact centre, but is displaced towards the convex side, so that the line of maximum velocity is more sinuous than the glacier itself. The velocity diminishes also from the surface of the ice towards the bed of the glacier. The observations on which this statement rests are neither numerous nor satisfying; nevertheless, they are sufficient to establish the fact. It will appear that, as Forbes said, the flow of a glacier is very much like that of a river; if we consider a river which is flowing into a sandy region, where the water is gradually lost by seepage, the analogy is still more striking. In valley glaciers of fairly uniform slope, the velocity is greatest at the

*névé* line and diminishes as we ascend or descend from there. This law is subject to many exceptions; if the valley contracts in descending, there must be an increase in velocity; if the slope of the valley increases, this will also increase the velocity; in glaciers which reach the sea and break off in bergs the velocity increases as we approach the end, as a result of the lack of support in front. There is also a slight movement into the glacier in the reservoir, which is greatest where the accumulation is greatest, and one towards the surface in the dissipator, which is greatest where the waste is greatest. As to actual values in velocities, we find that the Mer de Glace has the greatest velocity of all glaciers in the Alps, its maximum amounting to  $35\frac{1}{2}$  inches a day. The greatest velocity of the Aletsch, the largest glacier of the Alps, is 20 inches a day. For other Alpine glaciers we find various velocities down to an inch or two a day, or even less for the smaller ones. Of larger glaciers, the Muir in Alaska has a velocity of about 7 feet, near where it reaches tidewater; and one of the larger ice streams of Greenland, the Upernivik, was found to have a velocity of 99 feet a day at one point near its end.

**Cause of Glacial Motion.** Many theories have been advanced to explain why the ice of glaciers, which is apparently so very brittle, should flow like a plastic substance. There are two questions to be answered, viz., What is the force causing the ice to move, and what property of ice enables it to move as it does? There is a general unanimity at present in the belief that the weight of the ice itself is the only force causing the motion, but there is not so much unanimity in answering the second question. Three explanations still hold their ground: First, according to Forbes and Rendu, the ice, in spite of the fact that it is very brittle to any rapid change of shape, is truly plastic to slow changes; just as shoemaker's wax will break under a sharp blow, but will allow a bullet by its own weight to sink slowly through it. This has been abundantly proved by the experiments of Pfaff, Andrews, Main, McConnell, and Kidd. Experiments on single ice crystal show that the crystal is plastic in planes at right angles to the optic axis. This is the *plastic* or *viscous* theory.



PLAN OF GLACIER.

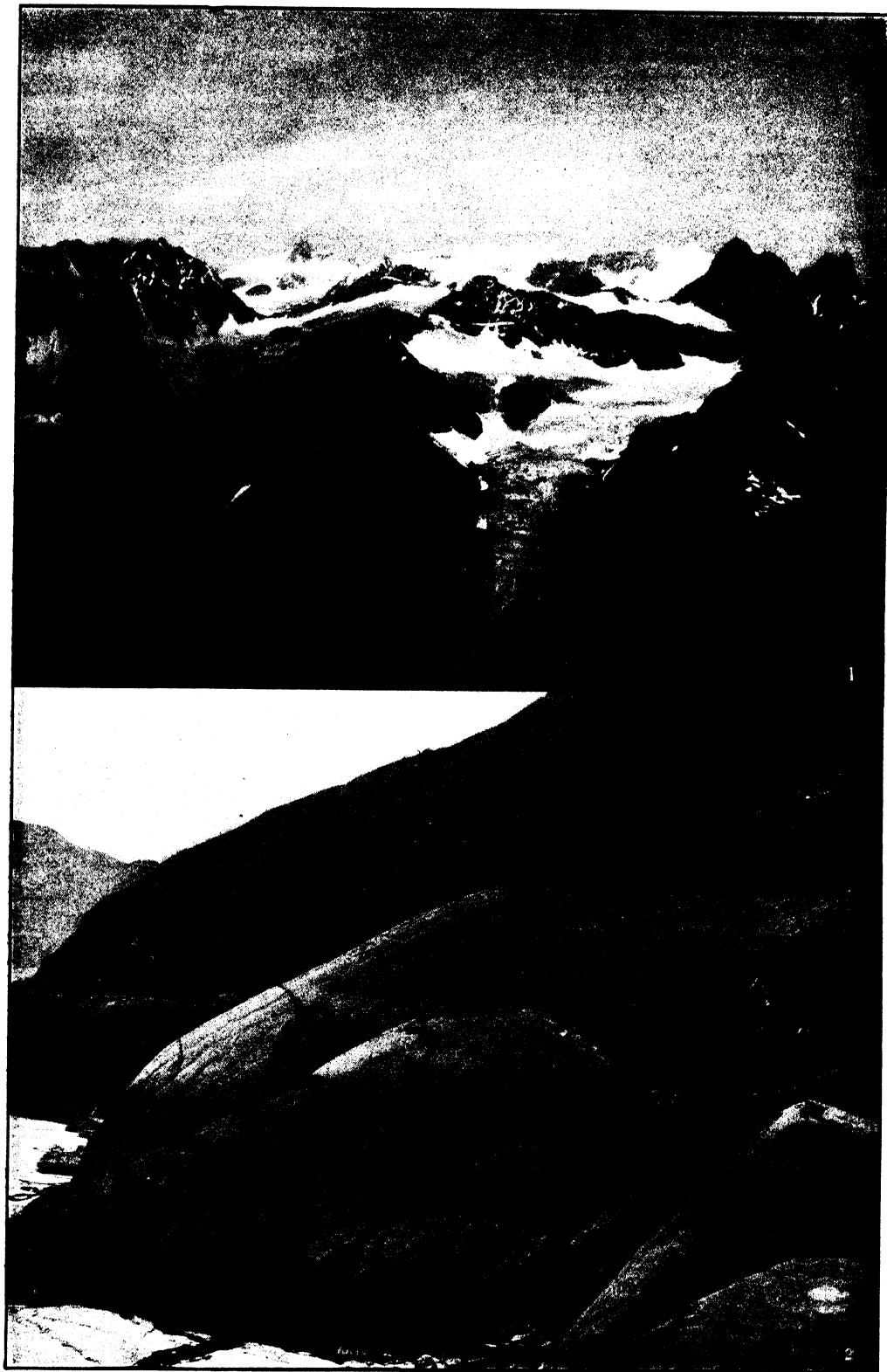
Second, Tyndall considered ice to be devoid of true plasticity, but thought that in a glacier it is continually shattered and refrozen. He was led to this idea by the fact which Faraday dis-

covered, that two pieces of ice when brought into contact will freeze together. He showed by many experiments that ice could be crushed and forced through curved tubes and come out clear ice, the fragments having entirely coalesced. This is the *fracture* and *regelation* theory. Third, James Thomson discovered that the freezing point of ice is lowered  $.0075^{\circ}$  C. from an increase of one atmosphere of pressure, and applied this fact to the explanation of glacial motion. He supposed that at any point where, by the movement of the ice, the pressure becomes a little greater than the average, the freezing point will be lowered and a small amount of ice melted; the pressure being thus relieved, the ice will move slightly, and the pressure will be transferred to other points; the water thus formed will be squeezed through crevices in the ice to other points where the pressure is less, and will there freeze. A continuation of this process will result in the general progression of the ice down its valley. This is the *pressure* and *regelation* theory.

**Crevasses.** Although the ice of glaciers can suffer some distortion without breaking, if the rate of distortion is too great the ice will crack and great crevasses form. Crevasses can be divided into distinct classes: *Marginal* crevasses, which occur on the sides of glaciers and point upstream at an angle of about  $45^{\circ}$ ; they are the result of increasing velocity from the sides to the centre of the glacier. There must also be a tendency to the formation of crevasses at the bottom of the glacier pointing upstream, but it is extremely probable that the weight of the ice is sufficient to prevent their forming except occasionally very near the end of the glacier. *Transverse* crevasses are formed when the slope of the bed increases. *Longitudinal* crevasses form near the end of the glacier, especially when the ice spreads out on a plain; they are due to the pressure of the ice behind and are usually arranged radially. Irregular crevasses may be formed as the result of some irregularity in the bed of the glacier. There is usually a very large crevasse, called the *bergschrand*, at the upper margin of the reservoir; it is due to the more rapid motion of ice of the reservoir pulling it away from the ice clinging to the mountain slopes. In the dissipator the crevasses are in full view, but in the reservoir they are frequently covered with snow; this makes traveling above the snow line very dangerous, except for parties of several persons properly roped together. When crevasses first form they are mere cracks, which afterward widen out as the result of the motion of the ice and the melting of their sides, until they sometimes are 50 or even 100 feet wide. They may be half a mile or more in length, but the great depths which they are supposed to reach are exaggerated; they are rarely so much as 200 feet deep, and probably never as deep as 300 feet.

**Moraines.** The rocks and debris which fall upon the surface of the glacier and are carried down by it, and the material pushed along under the ice, are called *moraines*. They cannot be seen in the reservoir, as they are there covered by the snow, but they are very striking features of the dissipator. *Lateral* moraines are formed by the rocks falling from the mountains upon the sides of the glacier. When two tributary glaciers unite to form a trunk glacier, two of the lateral moraines unite to form a *medial* moraine, which from a distance looks like a great dark

## GLACIERS



1. Forno Glacier, Switzerland.

2. Sebree Island, Glacier Bay, Alaska, showing rock glaciated by Muir Glacier when it was larger.

## GLACIERS



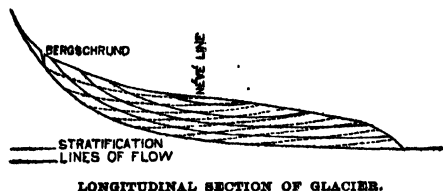
### FORNO GLACIER

1. Reservoir showing the névé line, outcrop of the strata and crevasses.
2. View showing moraines.



line drawn upon the surface of the white ice marking out the direction of motion. The ice under the moraine, being protected from the air and sun, does not melt as rapidly as the unprotected ice, and, therefore, is left by the general waste of the surface as a great ridge rising sometimes 100 feet above the general level of the ice. *Reservoir* moraines, so called from their origin, are formed by material falling upon the reservoir, where it is covered by the snow and later brought to the surface of the dissipator by the motion of the ice and the melting. Moraines which can hardly be distinguished from reservoir moraines may sometimes be formed from the material plucked from a projecting point in the bed of the glacier and carried along in the body of the ice, to be exposed later at the surface by the melting. The material pushed along under the ice is called the *ground moraine*; it is made up of *débris* fallen under the glacier at the sides or through crevasses or the *bergschund*, and material plucked from the bed of the glacier.

**Structure of the Ice.** The origin of the glacial ice is the snow that falls in the reservoir. By thawing and freezing, this soon changes into a turbid ice filled with many air bubbles. Crystallization starts from numerous centres, around which the molecules of ice gradually rearrange themselves until the whole mass is made up of crystals of clear ice (though still containing many air bubbles) with their respective optical axes turned in various directions. The crystals at this stage are about the size of peas and adjoin one another in surfaces which bear no relation to the geometric crystalline faces. By a process of recrystallization some of these crystals grow at the expense of their neighbors until finally many of them become 4 or 5 inches in diameter. During this process the ice is moving down the valley, so that we find the crystals of increasing age, and therefore increasing size, mixed in with smaller ones as we go from the *névé* fields down the glacier. The sun's rays penetrating the ice for a short distance melt the ice along the junctions of the crystals, which can then readily be separated. The sun's rays also cause melting in the interior of the crystals at various points; the cavities thus formed are flat disks or six-angled stars; as the water occupies less space than the ice from which it was melted, each of these cavities contains a small vacuum which is more easily visible than the sides of the cavity. These cavities are known as Tyndall's figures, and always lie with their



flat sides at right angles to the optical axis of the crystal, whose direction may thus be easily determined.

**Stratification and Banded Structure.** On the sides of crevasses in the reservoir the layers of hardening snow, due to successive seasons, can be readily distinguished, and the outcrops of these strata can be followed for a short distance into the dissipator; but their appearance soon

changes, and the majority of observers claim that as the ice becomes consolidated the mark of stratification are obliterated. In the lower part of the dissipator, where the ice is thoroughly consolidated, it is found to be composed of bands of bluer and whiter ice, the color being caused by the amount of the contained air bubbles. These bands, as described by Forbes and others, follow the general shape of the bowl of a spoon pointing downstream. Each tributary has its own system of bands, though but one system is usually found at the end of the glacier. They are prominent at the sides near the end, and at the line of junction where two glaciers unite. Three explanations have been given of their origin. Agassiz considered them the modified form of stratification. Forbes looked upon them as surfaces where the principal amount of differential motion took place. Tyndall thought they were caused by pressure and were analogous to the slaty cleavage of rock. Forbes's idea has been practically discarded, and glacialists are divided between the explanations of Agassiz and of Tyndall.

**Temperature.** Theory and, so far as they go, observations indicate that the body of the glacier is at the temperature of melting ice.

**Variations.** The relative sizes of the reservoir and dissipator are determined by the condition that the accumulation in the first must equal the waste in the second. The accumulation depends upon the size of the reservoir and the snowfall, and the waste on the size of the dissipator and the rate of melting. The melting is due principally to direct radiation from the sun and to condensation of water vapor from the air; it will readily be seen that in cold wet periods glaciers will advance, and in warm dry periods they will retreat. Glaciers are, therefore, indicators of climatic variations. In the last 30 years much attention has been given to the study of the variations of glaciers. It has been discovered that in the Alps the glaciers have made no permanent change within the last 300 years, but that they have grown larger and smaller in size, making a complete fluctuation on the average once in 35 years. Records of the glaciers of Iceland and of Scandinavia show that in the seventeenth century they were much smaller than they are at present; early in the eighteenth century a general advance began which continued well into the nineteenth century, and was characterized by a very marked increase in the extent of the ice; since then there has been a small retreat. The same general order has been followed in southeastern Alaska, though the dates cannot be definitely determined. It is probable that the glaciers of other Arctic regions have experienced similar variations. With few exceptions, the glaciers in all parts of the world are now in retreat.

**Work of Glaciers.** The moraines are carried along by the glacier and deposited on the sides of its valley and at the end of the ice. Some rocks become embedded in the ice and act like graving tools in making long, straight scratches in the bed rock, whose surface is also smoothed by finer material moved by the ice. A region which has been covered by a glacier usually shows smooth and rounded rock surfaces marked with parallel scratches; heaps of rocks, more or less angular, are dumped irregularly about, frequently forming small lakes. These rocks are often of a different kind from the underlying country rock, showing that they have been trans-

ported from a distance, and their angular or subangular forms show that they have not been transported by water. They are called *erratics*. Among them some will have smoothed and scratched surfaces. It is by studying the distribution of scratches, smoothed surfaces, and erratics, that geologists have been able to show the existence of a former ice age when large parts of Europe and of North America were covered by great sheets of ice.

The power of glaciers to erode valleys or lake basins has been greatly discussed, without a conclusion commanding general assent being reached. Leading geologists entertain diametrically opposite opinions on this subject. Fiords show the effects of ice erosion to a greater or less extent, although in most cases they were originally narrow stream valleys. The work of the ice has consisted in deepening the channels, particularly in the central part which often is lower than the outlet. The mere wear or abrasive action of a glacier on its bed may be relatively slight; on the other hand the ice doubtless exerts a strong plucking force upon rocks, sufficient to tear away any fissured or loosened material.

**Bibliography.** For general description and theoretical discussion of glaciers, consult: Shaler and Davis, *Glaciers* (Boston, 1881); Agassiz, *Études sur les glaciers* (Neuchâtel, 1840); Schmidt, "Eine neue Glacialtheorie," in *Petermann's Mittheilungen*, vol. xlv (Gotha, 1898); Agassiz, *Nouvelles études et expériences sur les glaciers actuels* (Paris, 1847); id., *Untersuchungen über die Gletscher* (Solothurn, 1841); Heim, *Handbuch der Gletscherkunde* (Stuttgart, 1885); Rendu, *Theory of the Glaciers of the Navoy*, trans. by Wills (London, 1874); Forbes, *Occasional Papers on the Theory of Glaciers* (ib., 1859); Agassiz, *Geological Sketches* (Boston, 1890); Gilbert, *Glaciers and Glaciation* (Washington, 1910); Hobbs, *Characteristics of Existing Glaciers* (New York, 1911). Descriptions of individual localities may be found in Reid, *Studies of the Muir Glacier, Alaska* (Washington, 1892); id., "Glacier Bay and its Glaciers," in *United States Geological Survey Report* (ib., 1895); Russell, *Glaciers of North America* (Boston, 1897); Tyndall, *The Glaciers of the Alps* (London, 1860); Martin, *Glaciers and Glaciation in College Fjord, Alaska* (Berlin, 1913). See GEOLOGY.

**GLACIER BAY.** A glacial fiord extending 60 miles northward from Icy Strait, Alaska. Glacier Bay penetrates the St. Elias Range, which discharges nine great glaciers into the fiord, five having a sea front of 1 mile or more (Map: Alaska, M 6). The largest glacier, named for Professor Muir, is enormous in its proportions. It is over 200 feet high, 3 miles broad at the sea, and is equal in area to the State of Rhode Island. Innumerable icebergs discharge annually, and the bay is so ice-encumbered, for years at a time, as to be dangerous for navigation.

**GLACIER BEAR.** The small gray bear (*Ursus emmonsii*) of the St. Elias Alps, Alaska. See BEAR.

**GLACKENS, WILLIAM J.** (1874- ). An American portrait, landscape, and figure painter, born in Philadelphia. He studied in his native city and in Paris, where he was strongly influenced by the great modern Frenchmen. His art developed through contact with the best of his contemporaries and yet remained personal

and original. In the field of illustration, which occupied his attention for some time after his return to America, his remarkable sense of character, expressed in drawing of masterly quality, soon placed him at the head of the profession. His painting was even more important and brought him membership in the Society of American Artists (1905), and an associate membership in the National Academy (1906) and in the Association of American Painters and Sculptors (1911). Among his awards were a gold medal at the Pan-American Exposition at Buffalo (1900) and another at the St. Louis Exposition (1904). Portraits, landscapes, and figure compositions were all handled successfully by Mr. Glackens. From the observation of the daily life of the American city, his interest turned to more specifically æsthetic problems. Among his best-known paintings are "May Day Party," the best picture of its kind thus far painted by an American artist, and "Girls Bathing" (1911).

**GLADBACH**, glätbâch, or **BERGISCH-GLADBACH**, bër'gësh-. A town of the Rhine Province, Prussia, 8 miles northeast of Cologne (Map: Germany, B 3). It has four large paper mills, employing 1200 hands; produces cigars, coco-fibre mats, lumber, dyewood, iron ore, machinery and other iron products, powder, and fire brick. Pop., 1900, 11,435; 1910, 15,207.

**GLADBACH**, or **MÜNCHEN-** (mun'ken) **GLADBACH.** A manufacturing town of the Prussian Rhine Province, 16 miles west of Düsseldorf (Map: Germany, B 3). Among its many churches is the Münsterkirche, a fine old structure with a Gothic choir dating from the twelfth century, and an eighth-century crypt. There are three monasteries, a synagogue, and a teachers' seminary. Gladbach is the centre of the cotton industry in the Rhine Province. There are establishments for the manufacture of silk and woolen goods, dye and print goods, and thread; also soap, shoes, chocolate, confectionery, wagons, brushes, paper, leather, furniture, machinery, hosiery, books, rope, bricks, and meal. The number of persons employed in the factories is over 16,000. Gladbach had its origin in the Benedictine abbey founded originally in the eighth century, and abolished at the beginning of the nineteenth. Pop., 1900, 58,023; 1910, 66,414, mostly Roman Catholics.

**GLADDEN, WASHINGTON** (1836- ). An American Congregational clergyman and writer, born in Pottsgrove, Pa. He prepared for college at the Owego (N. Y.) Academy, and graduated at Williams College in 1859. He was pastor of Congregational churches in Brooklyn, N. Y., Morrisania, N. Y., North Adams, Mass., and Springfield, Mass., from 1860 until 1882, when he removed to Columbus, Ohio, to become pastor of the First Congregational Church there. As an editor, he was connected with the *Independent* from 1871 to 1875, and with the *Sunday Afternoon* (Springfield, Mass.) from 1878 to 1880. He received the degree of D.D. from Roanoke College, Virginia, and that of LL.D. from the University of Wisconsin and Notre Dame University, Indiana, a Catholic institution. His sermons and books show vigorous, direct, and practical thought, and a gift of graceful expression. He put into practice his frequently expressed convictions regarding the duties of citizenship by serving in the city council of Columbus from 1900 to 1902. On Jan. 1, 1914, he retired from active work and became pastor

emeritus. His books, sensible and scholarly discussions of social and civil reforms, and of the application of Christianity to everyday life, include: *Plain Thoughts on the Art of Living* (1868); *Workmen and their Employers* (1876); *Being a Christian* (1876); *The Christian Way* (1877); *The Lord's Prayer* (1880); *The Christian League of Connecticut* (1883); *Things New and Old* (1884); *The Young Men and the Churches* (1885); *Applied Christianity* (1887); *Parish Problems* (1888); *Burning Questions* (1889); *Who Wrote the Bible?* (1891); *Santa Claus on a Lark* (1892); *Tools and the Man* (1893); *The Cosmopolis City Club* (1893); *The Church and the Kingdom* (1894); *Ruling Ideas of the Present Age* (1895); *Seven Puzzling Bible Books* (1897); *Social Facts and Forces* (1897); *The Christian Pastor and the Working Church* (1898); *How Much is Left of the Old Doctrines* (1899); *Social Salvation* (1902); *Witnesses of the Light* (1903), the W. B. Noble lectures at Harvard; *Where Does the Sky Begin?* (1904); *The New Idolatry* (1905); *Christianity and Socialism* (1906); *The Church and Modern Life* (1908); *The Labor Question* (1911); *Present Day Theology* (1913); *Live and Learn* (1914). Consult his *Recollections* (Boston, 1909).

**GLADHEIM**, gläd'hëym (Icel., bright abode). In Norse mythology, the dwelling place of Odin, the largest and noblest of edifices. In this home is Valhalla (the hall of heroes), radiant with gold, to which are conducted all who fall in battle. The ceiling is formed of spears, the roof of shields, and the benches are strewn with coats of mail. According to the *Elder Edda* it has 540 gates, through each of which 800 men can go abreast.

**GLADIATOR**, gläd't-ä'tor (Lat., swordsman). One who in antiquity fought in the arena, at the amphitheatre in Rome, and in other cities, for the amusement of the public. The gladiators were generally captives, or condemned criminals, or, more often, slaves bought and trained for the purpose by masters (called *lanistæ*) who made this their business. The custom was borrowed by the Romans from the Etruscans. It had its origin in the practice of human sacrifices, or that of taking at funerals the lives of captives or prisoners of war, in honor of heroes who had died in battle.

After a time all great funerals of distinguished men were solemnized by human sacrifices, which took the form of combats, in which, to increase the interest of the spectators, the prisoners were required to kill one another; and as prisoners, and afterward other slaves, were kept for this purpose, they were trained to fight with skill and courage, to make the spectacle more impressive. In time these shows, instead of being a funeral rite, became a common amusement. The first gladiatorial combat we read of in Roman history was a contest of three pairs of gladiators, given by Marcus and Decimus Brutus, on the death of their father, in 264 B.C. In 217 B.C. the first Scipio Africanus diverted his army at New Carthage with a gladiatorial exhibition. In 207 B.C. a show of 22 pairs was given in the Forum. The exhibition of gladiators rapidly became popular. Magistrates, public officers, and candidates gave shows to the people, which consisted chiefly of these encounters. The emperors exceeded all others in the extent and magnificence of these spectacles. Julius Caesar gave a show of 320

pairs; Titus gave a show of gladiators, wild beasts, and sea fights for 100 days; Trajan gave a show of 123 days, in which 2000 men fought with one another or with wild beasts for the amusement of the Romans assembled in the Coliseum. A vast number of slaves from all parts of the world were kept in Rome, and trained for these exhibitions. Efforts were made to limit the number of gladiators, and diminish the frequency of these shows. The Emperor Augustus forbade more than two shows in a year; he ordered also that no gladiatorial show should be given by a man with a property of less than half a million sesterces. But it was difficult to restrain what had become a passion, and men even had such contests for the amusement of their guests at ordinary feasts. More than once, especially under Spartacus, Clodius, and Milo, the gladiators menaced the peace of Rome.

These shows were announced by show bills and pictures. The gladiators were trained and sworn to fight to the death. If they showed cowardice, they were killed with tortures. They fought at first with wooden swords, and then with steel. When one of the combatants was disarmed, or upon the ground, the victor looked to the Emperor, if present, or to the people, for further directions; if they completely concealed their thumbs, the defeated gladiator was spared; if they turned their thumbs downward, towards the defeated man, he was killed. (On this much-discussed subject, consult an important article by Post, "Pollice Verso," in *American Journal of Philology*, xiii, New York, 1892.) A victorious gladiator was rewarded not only with a branch of palm, but in more substantial ways: sometimes, too, he received his freedom. Though the gladiators at first were slaves, freemen afterward entered the profession. Senators and knights fought in the shows of Nero, and women in those of Domitian. The Emperor Constantine prohibited the contests of gladiators, 325 A.D.; but they could not at once be abolished. In the reign of Honorius a monk, Telemachus, went into the arena to stop the fight, but the people stoned him. Gladiatorial contests were finally abolished by Theodoric (500 A.D.).

The kinds of gladiators most frequently mentioned are the following: the *retiarius*, or net man (Lat. *rete*, net), who wore only a short tunic, and had as his weapon a net, attached to which was a rope, and a trident. He flung his net and, if successful in getting it over the head of his foe, easily dispatched him with his trident; if he failed in his cast, he drew in, if possible, the net with the rope, and fled. His adversary pursued, and so was called *secutor* (Lat., follower). (For these two kinds of gladiators, consult Bulwer, *Last Days of Pompeii*, near the end.) The *Samnites* fought with Samnite weapons—an oblong shield, short sword, plumed helmet. The *Thracæ* had a small shield and a sword or dagger curved somewhat like a scythe; they fought against the *mirmillones*, gladiators with Gallic armor, who had a representation of a fish as a sort of crest on their helmets. The *essedarii* fought on chariots (Lat. *essedum*, a British war chariot). The gladiators who fought with wild beasts were known as *bestiarii* (from Lat. *bestia*, a beast, as marked by size or ferocity or both). The contest between men and beasts in the amphitheatre was called *venatio*, a hunt.

For an elaborate account of the gladiatorial combats, gladiators, etc., consult Friedländer,

*Darstellungen aus der Sittengeschichte Roms* (8th ed., Leipzig, 1910), vol. ii, translated as vol. ii of *Roman Life and Manners under the Early Empire*, 4 vols. (New York, 1909).

**GLADIATOR**, *THE*. A tragedy by Robert Montgomery Bird (1841), in which Edwin Forrest frequently took the part of Spartacus.

**GLADIATORS' WAR**. See **SPARTACUS**.

**GLADIOLUS** (Lat., diminutive of *gladius*, sword; so called from the form of the leaves). A genus of plants of the family Iridaceæ, with a tubular perianth, the limb of which is divided into six unequal threadlike segments; the stigmas are undivided; and the seeds are winged. The roots are bulbous; the leaves linear or sword-shaped. The Cape of Good Hope produces the greater number of the known species, as also several allied forms once included in this genus. Most of the species have flowers of great beauty. Some of the improved varieties have spikes 2 to 3 feet long and are among the finest ornaments of flower borders and greenhouses. They are propagated either by seed or by offset corms; and in the former way many new varieties have been produced. In the garden culture of gladiolus the corms are planted out in early spring, preferably in sandy loam soil. The flowers open in July and August, and the blooming season can be prolonged by successive plantings in spring and early summer. In the fall the corms are dug and kept in a cold cellar over winter. Formerly southern Europe supplied the world with gladiolus, but the United States now supplies the great bulk of the crop. The gladiolus now has several societies devoted to its welfare. See *Plate of IRIS FAMILY*.

**GLADSTONE**. A city in Delta Co., Mich., 9 miles north of Escanaba, on the Minneapolis, St. Paul, and Sault Ste. Marie Railway, on the Escanaba River, and on Little Bay de Nocquet, an inlet of Green Bay (Map: Michigan, C 3). It has a shipping trade in coal and flour and has a cooperage, machine shops, manufactories of veneers, guns, and sporting goods, and lumber mills. Under a revised charter of 1904, the government is vested in an annually elected mayor and a unicameral council. The city owns and operates its water works and electric-light plant. Pop., 1900, 3380; 1910, 4211.

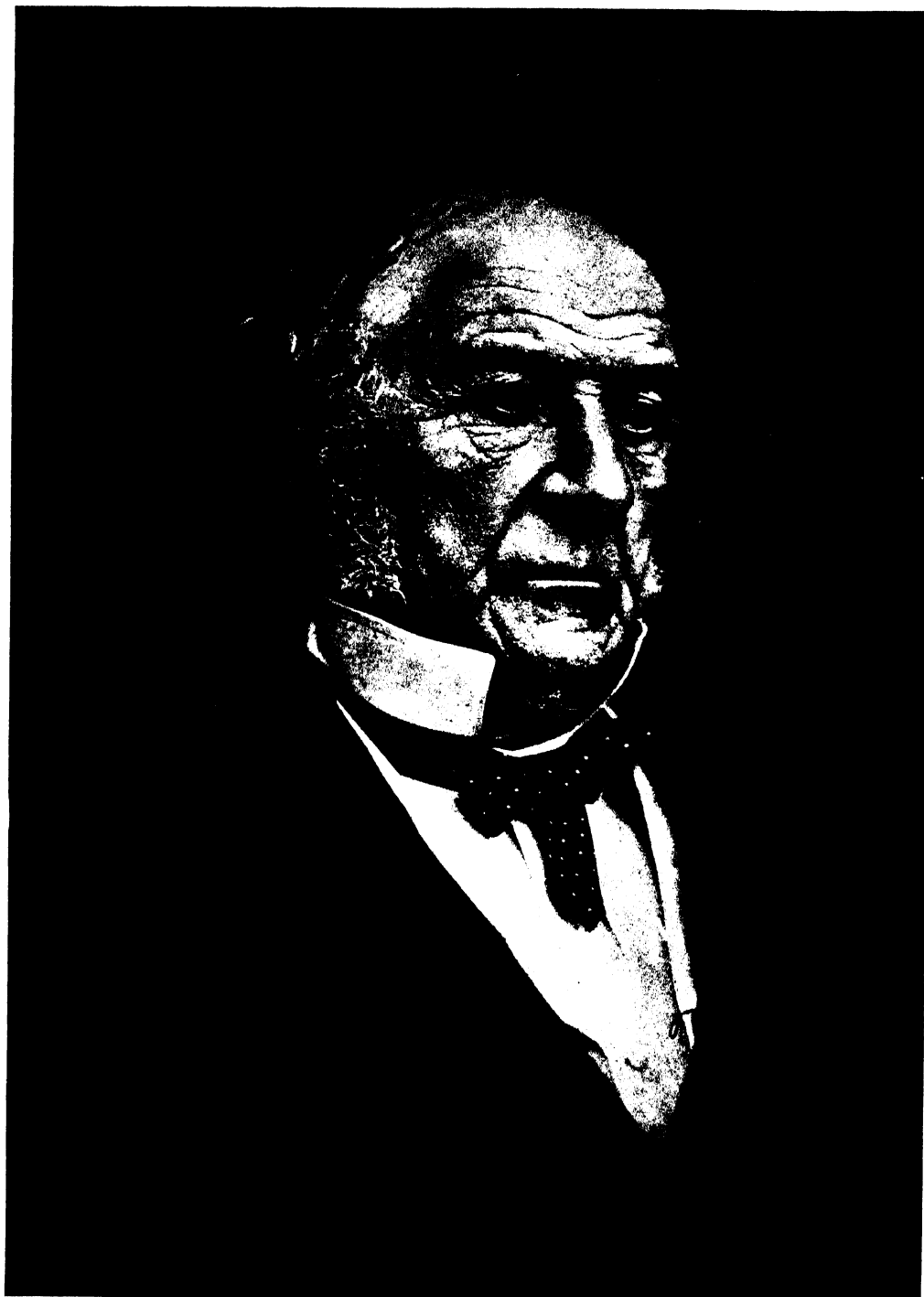
**GLADSTONE**, glăd'stūn, HERBERT JOHN GLADSTONE, first VISCOUNT (1854- ). An English politician, youngest son of William Ewart Gladstone. He was born in London; was educated at Eton and at University College, Oxford; was lecturer on modern history at Keble College from 1877 to 1880; and was private secretary to his father in 1880-81. He was a member of Parliament for Leeds from 1880 to 1885, and for Leeds, West, until 1909. From 1881 to 1885 he was Junior Lord of the Treasury, and he served also as Financial Secretary to the War Office (1886), Under Home Secretary (1892-94), and First Commissioner of Works (1894-95). He was chief Liberal whip from 1899 to December, 1905, and in 1905-10 was Home Secretary in the Campbell-Bannerman ministry. In 1909 he was named the first Governor-General and High Commissioner of South Africa. He was made Viscount in 1910, also G. C. M. G., and in 1914 G. C. B. In February, 1914, he resigned the governor-generalship of South Africa (after a good deal of trouble over labor and racial difficulties).

**GLADSTONE**, JOHN HALL (1827-1902). A British physicist and chemist, born at Hackney,

London. He studied at University College, London, and graduated as Ph.D. from the University of Giessen. He lectured at St. Thomas's Hospital in 1850-52; served on the lighthouse commission in 1858-61 and the War Office committee in 1864-68; and was professor of chemistry at the Royal Institution in 1874-77. He was one of the first investigators in the field of physical chemistry, notably in the relation of optics and spectroscopy to chemistry. With his assistant, Alfred Tribe, he is responsible for the copper-zinc couple. Actively interested in educational reform, he especially advocated changes in spelling. In 1853 he was elected a fellow of the Royal Society, which awarded him the Davy medal in 1897, and was first president of the Physical Society in 1874 and president of the Chemical Society in 1877-79. Besides a great number of scientific papers he wrote books and pamphlets on Christian evidence and apologetics, and also *Michael Faraday* (1872); *Spelling Reform* (1878; 2d ed., 1879); *Object Teaching* (1882).

**GLADSTONE**, WILLIAM EWART (1809-98). A British statesman. He was born Dec. 29, 1809, of Scottish parentage, in the city of Liverpool, where his father was a wealthy merchant, a member of Parliament, and a baronet. In 1821 he was sent to Eton, and in 1828 he entered Christ Church College, Oxford. Both at Eton and Oxford, Gladstone was distinguished for application to his studies, for his religious tendencies, his love of outdoor life, and his fondness for oratory and debate. He was successively secretary and president of the Oxford Debating Union, and in that society he delivered a powerful oration against the Reform Bill, which had been introduced into the House of Commons in 1831. In that year he took a double first in classics and mathematics.

Gladstone left Oxford in the spring of 1832, and after spending six months in Italy, entered Parliament as a member for Newark. The House of which he was a member was the first to be seated under the Reform Bill, which he had attacked while in college. He naturally attached himself to the Tory opposition under Sir Robert Peel, and waited for that party to come into power to win advancement. He delivered his maiden speech on June 3, 1833, in vindication of his father from charges brought against him concerning his conduct towards the slaves on his plantation in Demerara. In the last week of 1834 Peel came into power, and in January, 1835, he appointed Gladstone a Junior Lord of the Treasury, and in the following month Under-secretary for the Colonies. The Parliament elected in February, however, had a Liberal majority; on April 8 the Tory government went out and Gladstone again became a private member, which he remained until 1841, when, on Sir Robert Peel's coming back into power, he was appointed Vice President of the Board of Trade and Master of the Mint. In May, 1843, he became President of the Board of Trade, and so gained his first seat in a cabinet. Both as Vice President and as President he took a leading share in the work of reforming the tariff, and thus got his first lesson in finance. Already he gave unmistakable signs of genius in this direction, both in the work of arranging schedules and in the defense of his proposals on the floor of the House in exposition and debate. For a moment he endangered his career by resigning his office through uncertainty as to



WILLIAM EWART GLADSTONE  
FROM A PHOTOGRAPH TAKEN IN 1896



the support he should give an important government measure concerning an increased grant to Maynooth College, the Irish training school for Catholic priests. To Gladstone this seemed opposed to the principles he had supported in a book on the relations of the church and state, published by him in 1839, in which he had stood for a single church establishment under the control of the state, of which it should be the conscience. Rather than run the risk of compromising himself before his own conscience he resigned his office (Jan. 28, 1845) and became once more a private member of the House.

In December, 1845, he was appointed by Peel to the office of Colonial Secretary. To accept this he had to vacate his seat. This was the one break in a parliamentary career extending over more than half a century. Gladstone now gave Peel his assistance in formulating his free-trade measures which led to the repeal of the Corn Laws in 1846. In 1847 Gladstone resumed his seat in the House as Tory member for Oxford. In 1850 Peel died, and the first period in Gladstone's career, the period of apprenticeship to this great master, was terminated.

The new period extending from 1850 to 1868 may be called Gladstone's period of independent political reform. In 1852 he first came into conflict with his great rival, Disraeli, whose budget in that year he completely annihilated, thus bringing about the fall of the Derby ministry (December 17). In 1853 he presented his own first budget as Chancellor of the Exchequer in Aberdeen's coalition cabinet, and scored the first great personal triumph of his career. This budget was a masterpiece of equitable and efficient taxation. It increased the revenues of the state and placed the burden of the impositions where they could best be supported. His plans, however, especially in the matter of the income tax, which he was proposing by gradual steps to abolish completely, were somewhat interfered with by the intervention of the Crimean War, which demanded a new budget with increased taxation. In this budget Gladstone insisted that all the funds needed for the prosecution of the war should be raised by taxation, and not by the negotiation of loans. The conduct of the war, however, hurt the prestige of the Aberdeen government, and on Jan. 29, 1855, the ministry resigned. But Gladstone was the "inevitable" Chancellor for any administration, and he accepted the same office in Lord Palmerston's cabinet, resigning it, however, at the end of three weeks. He remained out of office for three years, during which time he published his *Studies on Homer* (1858) and undertook a mission to the Ionian Islands, where a strong agitation was being carried on for the cessation of British rule and annexation to Greece. In 1859 he returned to the Exchequer in the cabinet of Lord Palmerston, and in 1860 and 1861 he issued budgets that were marvels of financial statesmanship. He had now allied himself completely with Bright and Cobden, the latter of whom he had heartily supported in his attempt to negotiate a commercial treaty with France. This was accomplished in January, 1860. By his masterly tactics Gladstone won a complete victory over the House of Lords in 1861 after it had defeated his measure for the abolition of the tax on paper in the previous year. This was a great victory for popular education and the free press, and from that time dates the era of cheap newspapers for the people in England.

In July, 1865, Gladstone was defeated for Parliament at Oxford, but returned from South Lancashire. Lord Russell (q.v.) became head of the ministry and made Gladstone Chancellor of the Exchequer and leader in the House of Commons. In 1866 Lord Russell brought forward his first bill for the extension of suffrage and the redistribution of seats in the House of Commons. The support of this measure marks the beginning of Gladstone's adhesion to the Liberal party, towards which he had long been tending. His acceptance of office under Palmerston while still professing Tory principles was the first step in this direction. His defeat by his Oxford constituents because of his Liberal affiliations and tendencies strengthened his resolution to make his abandonment of Toryism definite. As for the bill itself, Disraeli and others united to defeat it, and the Liberal government was forced to resign (June 19). Lord Derby and Disraeli on their accession to power introduced another reform bill even more radical than that of Gladstone, who gave the new measure his hearty support, helping to carry it through in 1867.

In December, 1867, Gladstone succeeded Lord Russell as leader of the Liberal party. In this capacity he vigorously assailed the Conservative ministry, which after Feb. 26, 1868, was headed by Disraeli. In November the ministry appealed to the country on the question of the disestablishment of the Irish church, which had been made by Gladstone a party issue, and in the new Parliament the Liberals gained an overwhelming majority. On Dec. 4, 1868, Gladstone became Prime Minister and started in at once on a campaign of reform in Irish affairs. The disestablishment of the Irish church was effected in July, 1869, after a bitter struggle in the House of Lords. The next thing he essayed was to reform the Irish land system. This bill, though moderate in character, was nevertheless a step forward in the direction of giving the tenants more rights and keeping them from being crushed at pleasure by their landlords. This bill was carried in 1870. He also sought to establish an Irish National University that would satisfy the just demands of the Catholics of Ireland. This measure was defeated and he resigned (March, 1873). Disraeli refused to form a ministry, so Gladstone was forced to resume office for a time, though his strength was insufficient to carry any important reform measure. In January, 1874, he called for a dissolution in order to increase, if he could, the strength of his party in the House by a general election. The election brought defeat instead, and Disraeli returned to power. Gladstone, wearied by the weight of affairs, resigned (1875) his leadership and retired from official life.

The news of the Bulgarian horrors (1876) brought Gladstone once more into public life. By his speeches and pamphlets he aroused public feeling to the highest pitch of excitement, and throughout the Russo-Turkish War he denounced the pro-Ottoman policy of Lord Beaconsfield, acting once more as the leader of his party. On the issue of the Russo-Turkish War the Liberals carried the country in 1880, and Gladstone, elected from Midlothian, on April 23 became Prime Minister. Gladstone now resumed his position at the head of the Liberal party. He started in at once to continue the work of his first ministry. He introduced a second Irish Land Bill, which was thrown out of the House

of Lords. Ireland began to grow impatient and the Nationalist leaders in Parliament restive. The Home Rule movement took a new lease of life under Parnell, Dillon, and others, but as yet Gladstone had nothing in common with their cause. His ministry lost prestige in the conduct of affairs both in Ireland and abroad. The assassination (1882) in Phoenix Park, Dublin, of the Chief Secretary for Ireland, Lord Frederick Cavendish, and his undersecretary, Burke, followed by repressive legislation on the part of the government, alienated the Irish members in Parliament. The defeat of Majuba Hill (1881), and the generous terms of peace conceded the Boers, aroused public dissatisfaction. The failure to relieve Khartum, and the tragic death of General Gordon (1885), were fatal blows to the ministry. On June 8, 1885, Gladstone resigned and was succeeded by Lord Salisbury. The elections of November showed a slight preponderance of Conservatives and Parnellites over Liberals. To gain the support of the latter, Gladstone announced his adhesion to Home Rule; the Conservative government was overthrown, and on Feb. 1, 1886, Gladstone succeeded to the premiership for the third time. In April a Home Rule bill was brought into Parliament. (See HOME RULE.) The measure met with opposition from all sides. The Irish members objected to the clause which deprived Ireland of representatives to the Imperial Parliament. A serious defection occurred in the Liberal ranks, Lord Hartington and Mr. Goschen refusing to support the government, and being supported in their action by John Bright and Joseph Chamberlain. On June 7 the bill failed to pass a second reading, 93 Liberal votes being cast against it. Parliament was dissolved on June 26, but the elections resulted in the decisive defeat of the Liberal party, and on July 20 the ministry resigned. The elections of 1892 showed a majority of 40 for Home Rule, and on August 15 began Gladstone's fourth and last ministry. In 1893 a new and amended bill was brought before the House, and Gladstone, making the last great official fight of his life, triumphantly carried it. The House of Lords, however, threw out the measure (September 8), and the last stage of Gladstone's life work ended in apparent failure. Weary of the tumults of parliamentary life, he laid down his office on March 3, 1894, being succeeded by his colleague Lord Rosebery.

The last participation of Gladstone in public affairs was in connection with the Armenian massacres in 1896. He addressed meetings throughout the country and aroused public feeling, as he had done in 1876 over the Bulgarian atrocities. In 1898, on the 19th of May, he died in the eighty-ninth year of his life. He lies buried in the statesmen's corner of Westminster Abbey.

Gladstone was the greatest of the long line of Victorian political leaders and prime ministers. His only rival was Disraeli; but he had moral qualities which Disraeli lacked, and these more than made up for the superior brilliancy of the other, who looked with some contempt on Gladstone's principles and seriousness. Gladstone has been called an opportunist, and it is true that he more than once changed his position and went over to those against whom he had fought previously; but for any one who has studied Gladstone's career carefully these changes were not without a law of their own in Gladstone's intel-

lectual development. Each change bore a relation to a previous change, and viewing his career in the large we perceive a steady, gradual, and consistent progress. This is more than can be said of Disraeli, who, reversing his position quite as completely as Gladstone, did it to serve his own private ambitions. Gladstone cared too little for power, refused office too often, and incurred the anger of his constituents too readily by disregarding their wishes in matters of foreign and domestic policy, for it to be thought that he would ever have sacrificed his convictions to insure his own success. It was against his inclinations that he had entered public life in the first place. If once in the battle he stayed there, it was from a sense of duty characteristic of his moral seriousness. He always preferred his leisure, and more than once he withdrew from public affairs only to reënter the arena at the first recall.

Little has been said of Gladstone's literary labors, which were enormous. He was a scholar of the old type, caring only for literature and nothing for natural science. Many of his ideas were antiquated, for in literature he always remained the Tory, whatever he became in politics; that is to say, he believed in the principle of authority. To him the Bible was always the word of God and the law of Moses the law of Moses, while Homer was a real man describing real historic events. Still it is well to remember that Gladstone stood for an attitude towards the classics and the Scriptures which is associated with the high influence these works of antiquity have had for the race's civilization. There is something to be said for Gladstone's conservatism, perhaps even as against his radicalism in politics.

As to what Gladstone accomplished with his reforms in politics, it is too early to pass a complete judgment. It is as a reformer in finance and as a defender of the liberties of all classes of the English people that he stands forth most strikingly in history. Free trade, equal taxation, popular education, manhood suffrage—these are the great causes with whose beneficial results he is identified to his greatest glory. It is in his foreign policy that he was weakest. Domestic questions interested him almost to the exclusion of foreign matters, excepting when a race or a nation was suffering from oppression or tyranny. The wrongdoings of the Turks in particular called forth his denunciation, and he was always preaching, as it were, a holy war against the Moslem. He contributed to the independence and union of Italy by his letter about the political crimes of the rulers of the Two Sicilies. Mention has been made of his efforts on behalf of Bulgaria and the Armenians. On the other hand, because he cared nothing for foreign policies as such or for England's national prestige, he incurred the opprobrium of the people through what appeared to be his neglect of Gordon at Khartum, his submission to the Boers in South Africa, his willingness to submit to arbitration with the United States, and other matters in all of which he was content if he could avoid war and maintain an honorable peace. Personally Gladstone was a man full of charm and grace in his early years and full of dignity and grandeur in his old age. Justin McCarthy spoke well when he said that the House of Commons was no longer the same place without him.

Gladstone contributed articles on literary and



political topics to the *Quarterly Review* and other magazines. Most of these were published under the title, *Gleanings from Past Years* (8 vols., 1879-90).

In 1839 Gladstone married Catherine, the elder daughter of Sir Stephen Richard Glynne, of Hawarden Castle. She died on June 14, 1900. Four sons and four daughters were born, of whom the eldest, William Henry Gladstone, died in 1891, after sitting in Parliament from 1865 to 1885; Stephen Edward Gladstone is rector of Hawarden; the youngest son, Herbert John (q.v.), became member of Parliament in 1880. The youngest daughter, Helen, was for a few years vice principal of Newnham College, Cambridge.

**Bibliography.** Morley, *Life of William Ewart Gladstone* (3 vols., London, 1903; new ed., 1911), is a masterly work. Consult also: Archer, *William Ewart Gladstone and his Contemporaries* (ib., 1883); Russell, *Biography of W. E. Gladstone* (ib., 1891); Leech, *W. E. Gladstone: Life in Speeches and Public Letters* (ib., 1893); Robbins, *Early Public Life of Mr. Gladstone* (ib., 1894); McCarthy, *The Story of Gladstone's Life* (ib., 1897); Bryce, *Gladstone: His Characteristics as Man and Statesman* (New York, 1898); Williamson, *W. E. Gladstone, Statesman and Scholar* (London, 1898); Paul, *The Life of W. E. Gladstone* (ib., 1901); Smith, *My Memory of Gladstone* (New York, 1905); Slicer, *From Poet to Premier* (ib., 1909); Eversley, *Gladstone and Ireland* (London, 1912).

**GLAGOLITSA**, gläg'ò-lit'sà. One of the old Slavic alphabets, which contains characters arranged in the same order as in the Kirillitsa or Cyrillic (q.v.) alphabet. The shape as well as the numerical value of its letters is different from that of the Kirillitsa. The name is not derived from the fourth letter of the alphabet, *glagol*, but it is so called since it is a collection of significant, telling signs (from OChurch Slav. *glagolati*, to speak). Kirillitsa is chronologically an earlier name, but there are good reasons to believe that it was the original name of what is now known as Glagolitsa. Jagić upholds the very plausible theory that Cyril invented Glagolitsa. Taylor (*Archiv für slavische Philologie*, vol. v, Leipzig, 1881) and Jagić derive it from the cursive Greek (not uncials) of the eighth and ninth centuries. Only the following can be set down as positive facts: Glagolitsa began to spread not later than Kirillitsa, among both the southern and the western Slavs. Then it went out of use completely in the south; in the West it was also superseded by the Roman alphabet in Bohemia; while in Croatia and Dalmatia it long maintained its existence with difficulty, and Pope Leo XIII shortly before his death sanctioned the publication of ecclesiastical books in Glagolitsa characters. The Bulgarian ductus of the Glagolitsa is round, while the Croatian is more angular. The earliest Glagolitic manuscript extant belongs to the eleventh century. It is in the collection of Count Clotz, published at Vienna by Copitar in 1836 and known as *Glagolitsa Clotianus*. On account of the difficulty of reading, the Glagolitic monuments are usually printed transliterated in the Cyrillic alphabet. Consult: Taylor, *The Alphabet*, vol. ii (1899); the various papers by Jagić enumerated in his *Festschrift* (Berlin, 1908); Leskien, "Zur glagolitischen Schrift," in *Archiv für slavische Philologie* (ib., 1905), and his *Grammatik der altbulgarischen Sprache*

(Heidelberg, 1909); Murko, *Geschichte der älteren südslavischen Literaturen* (Leipzig, 1908); Geitler, *Die albanesischen und slavischen Schriften* (Vienna, 1883, with facsimiles).

**GLAIS-BIZOIN**, glä'bè-zwàn', ALEXANDRE (1800-77). A French legislator, born at Quintin (Côtes-du-Nord). After participating in the opposition to the government of the Restoration, he was elected deputy from Loudéac in 1831, served in that capacity for 17 years, and in 1848 became a member of the Moderate Republican party in the Constituent Assembly. He was in the Corps Législatif from 1863 to 1870, and then was appointed a member of the provisional government. In May, 1871, he was arrested and imprisoned for a short time during the reign of the Commune. His *Dictature de cinq mois* (1872) discusses the national defense during the Franco-German War.

**GLAISHER**, glä'shēr, JAMES (1809-1903). An English meteorologist and aeronaut, born in London. In 1850 he established the Meteorological Society, serving for many years as its secretary, and in 1866 was one of the founders of the Aeronautical Society of Great Britain. He is remembered especially for the balloon ascensions which he made between 1862 and 1866 in the interest of science. During his seventh ascension, Sept. 5, 1862, he and his pilot Coxwell attained an unprecedented height for a balloon carrying passengers. The best recent recomputations put the height he then attained at 8500-8700 meters, or 27,887-28,543 feet—an altitude that has been only slightly exceeded by modern aeronauts (9155 meters, or 30,025 feet, by Berson on Dec. 4, 1894) provided with artificial supplies of oxygen for overcoming the rarity of the atmosphere at these great heights. He held many important positions and published numerous books and papers on various topics connected with the mathematical sciences. His best-known work is *Travels in the Air* (1800). For a critical discussion of his famous high ascension of September, 1862, consult *Wissenschaftliche Luftfahrten* by Assmann and Berson (3 vols., Brunswick, 1899-1900).

**GLAISHER**, JAMES WHITBREAD LEE (1848- ). An English mathematician, born in Lewisham, Kent, a son of the preceding. He was educated at Trinity College, Cambridge, of which he became a fellow in 1871, was tutor in 1883-93, and lecturer in 1871-1901. He became editor of the *Messenger of Mathematics* in 1871 and of the *Quarterly Journal of Pure and Applied Mathematics* in 1878, was a prominent member of several English mathematical and astronomical societies, and wrote, in their *Proceedings* and elsewhere, many papers on pure mathematics, especially on the theory of numbers.

**GLAIZE**, gläz, AUGUSTE (1807-93). A French historical and genre painter and lithographer, born at Montpellier. He studied painting and lithography in Paris as the pupil of Eugène and Achille Devéria. After a few early works, such as "Dante Writing his 'Divine Comedy'" (1847), he turned his attention to the representation of abstract ideas in philosophy and ethics. His most important canvases in this manner are "The Drama of Human Folly" (1872; Arras Museum); "The Pillory" (Marseilles Museum); "What One Sees at Twenty" (Montpellier Museum). His work displays powerful color effects and abundant invention. He further executed several frescoes in the churches of Saint-Sulpice, Saint-Eustache, and others.

His son, PIERRE PAUL JEAN (1842- ), was born in Paris and was a pupil of his father and of Gérôme. His best-known painting is "Fugitives from Athens" (Amiens Museum), which, like all his work, is graceful and effective in design.

**GLAMMIS** (gläms or gläm'is) **CASTLE**. The imaginary scene of the murder of Duncan in Shakespeare's *Macbeth*. It is an ancient castle, the seat of the Earl of Strathmore, near Strathmore, Scotland, and is a fine example of the Scottish baronial castles.

**GLAMORGANSHIRE** (Welsh *Gwlad Morgannwg*). The southernmost county of Wales, bounded on the north by the County of Brecon, on the east by Monmouth, on the south and southwest by the Bristol Channel, and on the west by the County of Carmarthen (Map: Wales, C 5). The county is remarkable for its coal beds and its great iron industry. It also produces a considerable amount of grain, as well as large numbers of cattle, sheep, horses, and hogs. The chief towns are Cardiff, the capital, Merthyr-Tydvil, and Swansea. Area, 809 square miles. Pop., 1901, 859,931; 1911, 1,120,910.

**GLAMORGAN TREATY**. A compact made with the Irish Roman Catholics by the Earl of Glamorgan on Aug. 25, 1645. By it Charles I was to receive military aid, and Roman Catholicism was promised a more formal recognition by the government.

**GLANCE** (Eng. equivalent of Ger. *Glanz*, glitter, used in the same sense). A name formerly applied to minerals which have a lustre similar to that of metals. The following are some of the more important of these minerals: *antimony glance*, which is the mineral *stibnite*, or antimony trisulphide; *bismuth glance*, which is *bismuthinite*, or bismuth trisulphide; *copper glance*, which is *chalcocite*, or cuprous sulphide; *glance blende*, which is *albandite*, or manganese sulphide; *glance coal*, which is *anthracite*, or hard coal; *glance cobalt*, which is applied both to *cobaltite*, or cobalt sulpharsenide, and to *smaltite*, or cobalt diarsenide; *gold glance*, which is *sylvanite*, or gold and silver telluride; *lead glance*, which is *galena*, or lead sulphide; and *silver glance*, which is *argentite*, or silver sulphide. The name *glance wood* has been applied to an exceedingly hard variety of wood that is found in the tropics and is used for making tools.

**GLANCE COAL**. A popular term for any hard lustrous variety of coal, but usually applying to anthracite.

**GLAND** (Lat. *glans*, acorn). A term applied to a secreting organ. Glands are divided by anatomists into two great classes, viz., true secreting glands and ductless glands. The first class constitute special organs which are destined for the production of the chief secretions; as, e.g., the lachrymal, mammary, and salivary glands, the liver, pancreas, and kidneys; while the suprarenal capsules, the spleen, the thymus, and the thyroid belong to the second class.

**Secreting Glands**. A secreting gland consists of an aggregation of follicles (small tubes or sacs), all of which open into a common duct, by which the glandular product is discharged. The follicles are lined with epithelial cells, placed upon a hyaline basement membrane, which in turn is surrounded by a network of capillaries. These furnish the blood from which is elaborated the secretion by the cell substance or protoplasm of the epithelia, according to one

theory. Some assert that the secretion is composed of transformed cell substance. The secretion of a gland is either mucous (like saliva), serous (like tears), sebaceous (like the oil of the skin), or albuminous. The secretions of the testicle and ovary (not properly termed glands) are notable for containing living cells, the spermatozoa and the ova respectively. The simplest form of gland is the inversion of the surface of a secreting membrane into follicles, which discharge their contents upon it by separate mouths. Of this we have examples in the gastric glands and follicles of Lieberkühn, described under **DIGESTION, ORGANS OF**. Secreting glands are divided into: (1) *tubular*, consisting of cylindrical tubes, single or branching; and (2) *saccular*, composed of numerous sacs arranged about a short tube which joins other similar tubes. The sacs are called *acini*, and such glands are also called *racemose* (Lat. *racemus*, a bunch of grapes). To understand the structure of a complex gland like the liver or kidney, it must be followed from the simplest form in which it is known to occur through its various degrees of evolution. In this way the liver may be traced, from the lowest mollusca (where it exists as simple follicles, lodged in the walls of the stomach, and pouring their product into its cavity by separate orifices) up to man, in whom it is a highly complex organ; and similarly in the early fetal state of the higher animals, the liver and other secreting organs more or less resemble the persistent state of those parts in animals lower in the scale. In the same way the mammary gland, which is a structure of considerable complexity in the higher animals, presents a very simple arrangement in the lowest type of this class, the ornithorhynchus, being merely a cluster of caecal follicles, each of which discharges its contents by its own orifice. Sometimes a gland has several ducts (as, e.g., the lachrymal gland), but as a general rule the most important glands have only a single canal, formed by the union of the individual ducts, which conveys the product of the secreting action of the whole mass.

**Ductless Glands**. Glands of the second class resemble those of the first class in external conformation and in the possession of a solid parenchymatous tissue, but differ from them in the absence of a duct or opening for the removal of the products of secretion; and indeed, except in the case of the thymus, no material resembling a secreted product is yielded by any of them. In all of them the tissue mainly consists of cells and nuclei, with a great abundance of blood vessels. They furnish necessary material to the body in some yet unascertained way. If they are removed by operation, or absent from birth, or atrophied during life, the result is a condition of disease.

The *thyroid* (weight, 30-40 grams) is a very vascular gland, lying on the front and sides of the larynx, composed of connective tissue and follicles containing a viscid colloid substance, the product of the cells. It is a storage gland containing chemically large amounts of iodine combinations. Thyroid secretions have trophic functions with special reference to the nervous system. Absence of the thyroid gland in childhood is characteristic of cretinism (q.v.). Atrophy of the gland in adults causes myxedema (q.v.). Hypertrophy of the thyroid causes Basedow's disease (q.v.). After thyroidectomy there is diminished albumen and fat metabolism and lessened assimilation of sugar.

The *parathyroids* are smaller glands, closely connected with the thyroid anatomically, but having different functions. The parathyroids may be thought of as a neuromuscular balance wheel, or control. They have antitoxic functions also. If they are removed, tetany results. When the thyroid is absent, its functions may be replaced by administering the thyroid gland from sheep or the extract of it. Cretinism is so treated and cured universally.

The *pituitary body*, or *hypophysis*, is a gland of five grams' weight at the base of the brain. It is composed of two portions, seeming to have different functions not yet determined. In some way they preside over the nutrition, especially of the skeleton. Hypertrophy of this gland is associated with acromegaly (q.v.).

The *thymus gland* lies in the neck of the infant and behind the sternum. At birth it weighs 14 grams, at 14 years 27 grams, and then gradually atrophies. It is supposed to regulate nutrition and control blood pressure. Hypertrophy of the thymus has been given as the cause of sudden death in infants. In *status thymico-lymphaticus* the heart and arteries are very weak, the patient anæmic and generally sluggish. The condition predisposes to tuberculosis, and more than half of such subjects are found to die early of infectious diseases.

The *suprarenal glands* weigh about four grams and lie above the kidneys. They consist of medullary and cortical substance, the latter the most important. The internal secretion of these glands is essential to life. Their function is to control pigmentation of the skin, to arrest the action of poisons found in the body, and to govern the vasomotor system regulating blood pressure. An extract of the glands occurs as a definite chemical substance in the form of white crystals. This extract administered to man or other animals produces constriction of the blood vessels.

Addison's disease (q.v.) is a condition in which there is destruction of the adrenals with deep bronzing of the skin and great weakness. Administering adrenalin continuously will relieve it.

Mention should be made of the carotid, sacral, and abdominal-aortic paraganglion, etc., though their function is unknown. Consult: Luciani, *Human Physiology* (1913); Sajous, *The Internal Secretions* (6th ed., Philadelphia, 1914); Wm. H. Thomson, *Clinical Medicine* (1914). *The Internal Secretory Organs*, by Biedl (1913), contains a voluminous bibliography. See SUPRARENAL CAPSULES.

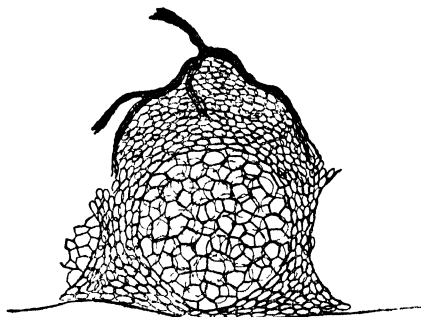
The so-called *lymphatic glands* belong to a different class of structures and will be described in the article under LYMPHATIC. They are not glands, but nutritive organs. See BARTHOLIN'S GLANDS; BRUNNER'S GLANDS; COWPER'S GLANDS; BREAST; LIVER; PANCREAS; KIDNEY; THYROID GLAND, COMPARATIVE ANATOMY OF. Consult: Gray, *Anatomy, Descriptive and Applied* (Philadelphia, 1913); Heitzmann, *Atlas der descriptiven Anatomie des Menschen* (Leipzig, 1902); Freeborn, *Notes on Normal Histology* (New York, 1901); Stoehr and Lewis, *A Text-Book of Histology* (Philadelphia, 1913); Cunningham, *Textbook of Anatomy* (New York, 1913).

**GLAND.** In plants, a single cell or group of cells especially adapted to form and secrete some substances. Glandular cells are usually distinguished from others by the granular character of their protoplasm, especially when in the active state. Glands may be superficial or internal.

*Superficial glands* may consist of a few cells or even a single cell, in which case they are often raised upon stalks and constitute the so-called glandular hairs, as upon the leaves of geraniums and primroses; they may have the form of disks upon short stalks, in which case the structure is known as a glandular scale; they may be groups of epidermal cells covering cushions of tissue, as in the so-called nectary (q.v.) in many flowers; they may be flush with the surface, pouring their secretion into gland-lined pits or depressions which may be narrow and deep or even branched canals, as in the nectar glands of some lily flowers. *Internal glands* in their simplest form consist of cells in which the secretion is formed and retained until released by the rupture or crushing of the tissues, as in the gland cells of capers. Not uncommonly the gland cells are destroyed by the plant itself, in which case the freed secretion occupies their place, as in the oil glands of the orange and lemon rind; in other cases they line an internal spherical or tubular reservoir, into which the secretion is poured, as in the resin tubes of pines (see figure).

Regarding the process of secretion nothing is definitely known. The secretion in most cases is formed by the protoplasm and within the cell wall; in others it may be developed at the surface, the materials for it being secreted by the protoplasm. In superficial glands the secretion is sometimes pushed through the cell wall as far as the cuticle, which it cannot penetrate, but which it lifts into a blister, e.g., the volatile oils secreted by many leaves.

Glands are named for the most prominent material which they secrete, as water, lime, nectar, oil, and resin glands.



GLAND OF ORANGE RIND.

The gland cells form a globular mass, secrete an essential oil, and finally become disorganized, leaving the oil free in the space they formerly occupied. The contents of the cells are not shown.

**GLAND, COMPARATIVE ANATOMY OF.** Neither a definition nor a classification of glands has yet been agreed on by comparative anatomists. Since the word itself offers no clew to its real meaning, we must attempt to define it from universally accepted examples. Among these may be mentioned salivary glands, lachrymal glands, sweat glands, and poison glands. All of these are organs which produce some particular substance from the blood with which they are supplied; furthermore, this substance is not cellular nor living, but is a mere chemical product. These facts give us a clew to our definition, and we may say that a gland is any cell or group of cells whose function is the production of a chemical substance, usually fluid, pe-

cular to itself. Such a definition will not include all those organs to which the name "gland" is given, but it will include all to which it ought to be applied. As an example of the incorrect use of the term, we may refer to "reproductive" or "genital" gland, as applied to the testis or ovary. These organs are not in any true sense glands, for they do not produce any chemical substance peculiar to themselves, but are simply the portions of the body where those cells are formed from which the next generation arises. So also the use of "gland" in connection with the suprarenal capsule, the pituitary body, and the pineal body is incorrect and confusing.

Various classifications for glands have been proposed based on their structure, whether unicellular or multicellular, simple or branched, etc.; but it is perhaps as natural and certainly as convenient to arrange them according to their function. Thus we may class those which open on the surface of the body and are developed in the skin as tegumentary glands; those connected with the process of digestion as digestive glands; those connected with the blood system as vascular glands; those associated with the respiration as respiratory glands; and those connected with the reproductive organs as reproductive glands. The tegumentary glands may well be grouped according to their structure, as unicellular and multicellular glands, and the same classification is often applied to all glands.

Unicellular glands are everywhere abundant in invertebrates, but in vertebrates they are confined almost entirely to the lower forms. Multicellular glands are to be regarded as aggregations of unicellular glands in one region. Soon the multicellular gland differentiates into a secretory and an efferent part, or duct. Multicellular glands with ducts are tubular or acinous. Globular glands also occur in the epidermis of Amphibia. The tubular glands may be simple, branched, or anastomosing. Tubular glands first occur in the Amphibia in a few cases, but they are very abundant as sweat glands in mammals. Acinous glands first appear in birds as uropygial glands, where they occur on the rudimentary tail and produce the oil for oiling the feathers. Among mammals acinous glands are highly developed and are of two kinds, viz., sebaceous glands and milk glands. The sebaceous glands open on the rim of the eyelid and on other special parts of the body, in intimate relation with hairs. In addition to oiling the hair, these glands probably have a sexual function in mammals, since their secretion has a decided odor.

Milk glands, characteristic of the mammalia, have probably a common ancestry with sebaceous glands, or they may even consist, indeed, of a group of highly specialized sebaceous glands. The glands of *Echidna* occur in the mammary pocket. Into this pocket the immature hatched young are placed, and there they are nourished by a secreted substance which is not like the milk of other mammals. The glands are in connection with hair follicles. Among marsupials there is a larger number of mammary pockets; but these pockets have lost their protective function, which latter function is assumed by the marsupium. In *Ornithodelphia* the nutritive function is subserved by the secretions of sweat glands. The region of the integument, at which the glands open, is usually modified for the purpose of transmitting to the young the secretion

of the glands. There are three types of these openings. The athelous type is found only in the lowest mammals; here the glands open diffusely on the surface without a true nipple. In the second type the glands open at the base of an elevated crater, and in the third the region of their opening is elevated to the apex of a cone. To the second type belong the glands of the carnivores and ungulates, and to the third class belong those of marsupials and primates. The number of these glands varies in different kinds of animals and with the number of young produced in a litter. In man two is the normal number, but in a number of cases supernumerary nipples have been recorded both for males and females. Such cases are atavistic and point back to the condition which existed in man's ancestor.

The liver and pancreas are recognized as the largest of the digestive glands, to which group also belong the salivary glands, gastric glands, and intestinal glands. The poison glands of snakes, as modified salivary glands, also belong here. Of vascular glands the kidneys are decidedly the most important, while respiratory glands include the arytenoid and tracheal. Of reproductive glands we find a great variety among both invertebrates and vertebrates, such as the yolk and shell glands, and in mammals the Cowper's and prostate glands.

Any attempt to classify glands according to the substances they produce is unsatisfactory. Thus, if we attempt to separate secreting from excreting glands, we find that, while the kidneys clearly belong in the latter class, the liver belongs to both, though chiefly secretory, and sebaceous glands are also difficult to classify. Perhaps the most obscure organs of this class are the so-called "ductless" glands, the spleen, thyroid, and thymus. They seem to produce some substance of great importance to the well-being of the body; but what it is, and how it affects the organism, are still involved in difficulties. However, as they are all closely associated with the blood system, they may well be called vascular glands.

**GLANDERS** (from *gland*, from Lat. *glans*, acorn). A virulent contagious disease due to the action of a specific microbe, the *Bacillus mallei*. The microbe was discovered in 1882 by Loeffler and Schütz. It is a short, rather stubby rod, with rounded ends. It stains irregularly, occurs singly, in pairs, or in long strings, and grows readily in the ordinary culture media. As a result of natural contagion, glanders is almost entirely confined to the horse, ass, and mule. Cattle enjoy an immunity from it, and sheep and pigs are highly resistant to natural contagion. Dogs, cats, and wild carnivora may become infected by eating the meat of glanderous horses. Glanders has been known since the time of the classic Latin and Greek writers as one of the most dreaded horse diseases. Its distribution is practically universal, though it is said not to occur in Australia.

Glanders appears under several forms with different symptoms. The acute and chronic forms of glanders are universally recognized. The acute form begins with a high fever. The coat is staring, and there are frequent chills. The mucous surfaces are reddened or sometimes yellowish, purulent ulcers appearing on those of the nose. These ulcers rapidly increase in size and depth. Painful swellings occur on various parts of the body, especially in the

neighborhood of the lymphatics. In many cases the joints of the legs are affected by acute inflammation. Death generally occurs in from 8 to 30 days. Chronic glanders occurs in the skin form known as farcy, and as true glanders affecting the lungs and other internal organs. In farcy the symptoms begin by the formation of nodules under the skin, known as farcy buttons. The surrounding tissues are broken down, and running ulcers are thus formed. After a variable period these ulcers heal. The disease breaks out again, however, in the same or other locations. The farcy buttons occur most frequently on the neck, shoulders, and inside the thighs.

During the progress of ordinary chronic glanders the lungs are affected by glanderous pneumonia. A lobular V-shaped pneumonia, occurring at the various foci of infection, is characteristic of glanders. Tubercles of sizes varying from that of a millet seed to that of an egg are formed in the lungs, liver, spleen, and occasionally in the kidneys. The tissue of these tubercles breaks down, leaving cavities filled with pus, some of which, in long-standing cases, may ultimately heal.

The symptoms of chronic glanders which are most relied upon by practicing veterinarians for diagnostic purposes are nodular swelling of the submaxillary glands, a dry cough after exercise, farcy buttons on the skin, and a persistent purulent discharge from the nose.

The spread of the disease is due chiefly to the discharges from the nose and from farcy sores. The virus from these sources may contaminate harness, vehicles, fences, stables, water supply, etc., through which other animals are readily infected.

Nearly all the tonics and curative agents known to veterinary medicine have been used in the treatment of glanders, but without result. Medical treatment is of no avail. Spontaneous recovery takes place in rare instances. When the chief symptoms are those of farcy, apparent recovery takes place at intervals, followed by renewed outbreaks of the disease. The nasal symptoms may also cease and later recur. In chronic cases the disease may persist for several years before death occurs.

Glandered animals should be shot and buried or burned. Such procedure is required by law in nearly all countries. Stables and all articles with which glandered horses have come in contact should be disinfected.

For the detection of cases of glanders the symptoms already mentioned are not always sufficient. In latent cases recourse is had to several other means, including injections of mallein. This substance is prepared from the glanders bacillus and contains the glanders toxin, but not the living bacilli. An injection of this substance into healthy horses causes no reaction. In glanderous horses it produces an elevation of temperature, swelling of the submaxillary glands, and trembling, which subsides after a few hours. A rise in body temperature of 2° F. after a mallein injection is considered good evidence of the presence of glanders. Some investigators have reported quite striking curative effects from the continued use of large doses of mallein. Several reliable methods of serum diagnosis are now available for use, including the serum agglutination and precipitation reactions and the complement fixation test. The complement fixation test is considered to be the

most satisfactory single method of diagnosing glanders.

**Glanders in Man**, otherwise called **EQUINIA**. Man may acquire the disease by accidental inoculation from the horse, though several cases have been recorded in which glanders has been transmitted from one human being to another. The symptoms of acute glanders in man are: weakness, chills, muscular and articular pains, the appearance of nodules with swelling and redness, rise of temperature, and suppuration. A single ulcer may cause great swelling of the whole hand and arm, with oedema, enlarged glands in armpits, and subsequent ulcers and pustules upon the swollen surface. A discharge from the nasal cavities appears, watery and viscid at first, afterward purulent and very offensive. The nose becomes swollen and painful, and perforations of the cartilage occur. The mouth becomes dry, dark red, and thickly coated; constipation is followed by diarrhoea; intense nervousness or delirium may follow; albumin appears in the urine. Emaciation and prostration are followed by death in the fourth week, in fatal cases. Besides the acute form just described, there is also a chronic form of glanders in man, but this occurs very rarely. Consult: J. Law, *Treat-Book of Veterinary Medicine*, vol. iv (Ithaca, 1905-11); Hutyna and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. i (New York, 1913); E. W. Hoare, *A System of Veterinary Medicine*, vol. i (ib., 1913); Mohler and Eichhorn, "The Diagnosis of Glanders by Complement Fixation," *United States Department of Agriculture, Bureau of Animal Industry Bulletin 136* (1911); id., "Various Methods for the Diagnosis of Glanders," *United States Department of Agriculture, Bureau of Animal Industry Circular 191* (1912).

**GLANDINA** (Neo-Lat., from Lat. *glans*, acorn). A genus of large pulmonate mollusks, or land shells, of the shell-bearing slug family Testacellidae. It includes about 125 species, whose shells are somewhat fusiform in shape, smooth, polished, and beautifully colored and marked. They creep about among the herbage and on bushes and are voracious feeders upon other smaller snails and all sorts of animal matter. Most of them belong to the American tropics, but one, at least, is European. Several species enter the southern border of the United States, of which the best known is the rose-tinted extremely variable *Glandina truncata*, which is illustrated on the Colored Plate of NORTH AMERICAN SNAILS, accompanying the article SNAIL.

**GLANDS, DISEASES OF THE.** The lymphatic glands are subject to enlargement from acute inflammation and abscess, usually in consequence of irritation of the part from which their lymphatics spring, as in the case of scarlet fever and diphtheria (q.v.), in which the glands of the throat are affected; or in the case of gonorrhoea (q.v.), in which the glands of the groins are affected; in bubonic plague, in which the glands of the groins, armpits, or neck, etc., may be involved. The treatment of such abscesses is purely surgical. A much more troublesome affection of the glands is the slow, comparatively painless, at first dense, solid swelling which they undergo in scrofula (q.v.), which tends very slowly, if at all, to suppuration and sometimes remains for years. In syphilis (q.v.) and cancer there are also en-

largements of the lymphatic glands. Scrofulous or tubercular diseases of the mesenteric glands in children constitute *tabes mesenterica*. (See MESENTERY.) The larger glands, as the liver, kidney, pancreas, spleen, thyroid, thymus, testicle, and even the pituitary gland, have all their special diseases, which are noticed under the names of these organs.

*Glandular fever* is a disease of childhood, probably of infectious origin, and characterized by a sudden onset, moderate fever, and swelling of the glands of the neck, and sometimes those of the axilla and groin. The disease is not dangerous, but complications, the most serious of which is nephritis, may lend gravity to the case. Isolation, mild purgation, rest, and symptomatic remedies are indicated in the treatment.

**GLANEUSES**, glá'nēz', LES (Fr., The Gleaners). A celebrated painting by Jean François Millet (1857) in the Louvre, representing a field in which three women are picking up the forgotten stalks, while the laborers are seen with loaded wagons in the background. The picture is remarkable for its effects of light and is considered one of Millet's best works. For illustration, see MILLET, JEAN FRANÇOIS.

**GLANVILL**. The putative author of the first classical textbook of the English common law. This work, *A Treatise on the Laws and Customs of England (Tractatus de Legibus et Consuetudinibus Angliæ)*, appears from internal evidence to have been composed towards the close of the twelfth century and in the last years of the reign of Henry II. The Glanvill whose name it bears is doubtless the celebrated Ranulph de Glanvill, Chief Justiciar and Prime Minister of Henry, one of the conspicuous figures of that stormy period of English history. He came of a Suffolk family of position, was sheriff of Yorkshire from 1163 to 1170, and in 1174, when sheriff of Lancashire, led the forces of the King against the invading Scots and won a great victory. Thereafter his place was at the right hand of the King as trusted adviser, ambassador, prime minister, and justiciar. He died at Acre in 1290, to which place he had gone with Richard I on his crusade to the Holy Land.

But there is no trustworthy evidence that Ranulph de Glanvill wrote the law book attributed to him. It is more likely to have been the work of some learned clerk at his court, perhaps of his secretary and kinsman, Hubert Walter, and that the title of the work is a dedication rather than an attribution. But there can be no doubt that it represents the law of Glanvill's time and is a correct picture of the legal system which he was engaged in shaping. Though the writer must have had some knowledge of the canon law, his work is English both in matter and arrangement. That is to say, it is not "institutional" and scientific in form, but empirical and practical. It sets forth the procedure of the King's Court, the *Curia Regis*, the various pleas which it will entertain, the several classes of wrongs which it will remedy, and the plea appropriate to each, and so considers the substantive law, both civil and criminal, after the usual common-law method, from the standpoint of procedure. It immediately took high rank as a legal authority and retained its unquestioned supremacy until superseded, 60 or 70 years later, by Bracton's great work. In the meantime many editions, as we should call them, by various annotators, ap-

peared, and many of these manuscripts are still in existence. A Scottish version, known as the *Regiam Majestatem*, long passed as an original treatise.

Glanvill was first printed in the year 1554 at the instance of Sir W. Stanford, a judge of the Court of Common Pleas. It was early translated into French, and an English version by Beames appeared in 1812. A new edition of Beames's translation has recently appeared under the careful editorship of Prof. Joseph II. Beale, Jr. (Washington, 1900).

**GLANVILL**, JOSEPH (1636-80). An English divine, born at Plymouth. He graduated at Exeter College, Oxford, in 1655, took the degree of M.A. at Lincoln College in 1658, and became chaplain to Francis Rous, provost of Eton. After the Restoration he conformed, and in 1660 became rector at Wimbish, Essex, by appointment of his brother, a prominent London merchant. He became a friend of Henry More, but was not himself a Platonist, and was one of the early fellows of the Royal Society. His first and best-known work, *The Vanity of Dogmatizing* (1661), an attack on the scholasticism of the Oxford school, anticipates Hume's theory of causation and foreshadows the electric telegraph in the words: "to confer at the distance of the Indies by sympathetick contrivances may be as natural to future times as to us is a literary correspondence." It contains the story of the "Scholar Gypsy" from which Matthew Arnold obtained the basis for his poem. Glanvill was appointed rector of the Abbey Church at Bath in 1666, and chaplain in ordinary to Charles II in 1672. During the "Popish Plot" excitement he wrote a spirited attack on the nonconformist sects, *The Zealous and Impartial Protestant* (published in 1681). Among his voluminous works, written in a rather rhetorical style, are: *Lux Orientalis* (1662), a defense of More's doctrine of the preexistence of souls; *Scepsum Scientifica: or Confess Ignorance the Way to Science* (1665; reprinted 1885), a revision of his first work, in which, as in *Philosophical Considerations Touching Witches and Witchcraft* (1666) and *Sadducismus Triumphatus* (1681), he collected evidence on superstitions and conducted psychological research; *Plus Ultra, or the Progress and Advancement of Knowledge Since the Days of Aristotle* (1668), a defense of the Royal Society; *The Ways of Happiness* (1670); *An Earnest Invitation to the Lord's Supper* (1673); *Essays on Several Important Subjects* (1676), containing his remarkable "Anti-Fanatick Theologie and Free Philosophy," in continuation of Bacon's *New Atlantis*; *An Essay Concerning Preaching* (1678).

**GLANVILLE**, BARTHOLOMEW DE. See BARTHOLOMÆUS ANGLICUS.

**GLAPTHORNE**, HENRY. An English dramatist, of whose life nothing is known except that he was a friend of Cotton and Lovelace and an adherent of the court, and wrote most between the years 1639 and 1643. His works consist of: *Albertus Wallenstein* (1639), an historical drama; *Argalus and Parthena* (1639), a dramatization in verse of a part of Sidney's *Arcadia*; *The Hollander* (1640); *Wit in a Constable* (1640); and *The Ladies' Privilege* (1640). Other plays have been credited to him; Bullen and Fleay both reprint *The Lady Mother* as his work, and Schelling attributes it to him. He wrote a volume of *Poems* (1639) and a poem called

*Whitehall* (1643). His works may be characterized as indifferent and feeble, with occasional bursts of beauty. Consult the memoir in the collected edition of his *Plays and Poems* (London, 1874); an essay in *Retrospective Review*, vol. x (ib., 1824); and Ward, *English Dramatic Literature*, vol. iii (ib., 1899).

**GLAREANUS**, glä'rá-i'nu:s, HENRICUS (1488–1563). A Swiss humanist and musical theorist, whose name was Heinrich Loriti. He was born at Mollis, Canton of Glarus (whence his name). He studied music under Cochläus at Cologne, where he also gave considerable attention to philosophy and theology. At the age of 24 he became poet laureate to Emperor Maximilian I. He taught mathematics at Basel from 1515 to 1517, when his friend Erasmus is said to have secured for him an appointment to the chair of philosophy at Paris. At first a defender of Reuchlin and a follower of the Reformation, he is believed subsequently to have changed his views and to have removed to Basel, accepting a professorship at the university in that city about 1529, whence he afterward removed to Freiburg. Biographical details concerning him are somewhat meagre and unreliable; more is known of his work. One of his principal publications is entitled *Isagoge in Musicen Henrici Glareani, etc.* (1516), the first work published by him, and treating of solmization, the intervals, tones, and modes. His *Dodekachordon* (1547) is still of great value to the historian and student of music, inasmuch as here for the first time the theory is enunciated that there should be 12, instead of 8, church modes, corresponding to those of ancient Greece. The work is divided into three parts and is furnished with numerous examples from the works of Ockenheim, Josquin de Prés, and other famous composers of the fifteenth and sixteenth centuries. Consult O. F. Fritzsche, *Henricus Glareanus* (Frauenfeld, 1890).

**GLARUS**, glä'rus. A canton of Switzerland, bounded by the Canton of St. Gall on the north and east, Grisons on the south, and Uri and Schwyz on the west (Map: Switzerland, D 1). Area, 267 square miles. The centre is taken up by a valley open on the north and inclosed on the east, south, and west by snow-capped mountains, most of them exceeding 10,000 feet in height. The chief river is the Linth, flowing into the Wallensee. Agriculture is of secondary importance, domestic products not sufficing to meet the home demand. The chief manufactured products are cotton, woolen, and silk goods, and beer. The canton is well provided with transportation facilities and carries on a considerable trade in textiles.

The form of government is thoroughly democratic. The people exercise their legislative power directly, assembling for that purpose once a year in the Landesgemeinde. The executive power is vested in a council of seven members elected by the Landesgemeinde for three years. The rural communities are administered by communal councils. Pop., 1900, 32,349; 1910, 33,316. The inhabitants are mostly Protestant and speak German. Capital, Glarus (q.v.).

**GLARUS**. The capital of the Swiss canton of the same name, situated on the Linth, 43 miles by rail from Zurich (Map: Switzerland, D 1). The chief buildings are the Gothic church, used in common by Roman Catholics and Protestants, and the government buildings, containing a natural history museum and an art

collection. The town is lighted by gas and electricity, and has water works. There are cotton-printing mills, bleacheries, cigar factories, and breweries. The commerce is of considerable importance. Pop., including the suburbs, 1900, 4940; 1910, 4877, mostly German-speaking Protestants.

**GLAS**, JOHN (1695–1773). Founder of the Glassites, or Sandemanians. He was born at Auchtermuchty, Fifeshire, Scotland. He studied at St. Andrews and Edinburgh, entered the ministry, and became a popular preacher. In his *Testimony of the King of Martyrs* (1727) he maintained that all national establishments of religion and all interference of the civil authority in religious affairs are inconsistent with the true nature of the Church of Christ and was thus probably the first to assert the voluntary principle in Scotland. For advocating such views he was first suspended and later deposed from the ministry (1730). He then formed an independent congregation in Dundee and in 1733 removed to Perth, where he built his first church. He was here joined by Robert Sandeman, who married his daughter and became the better-known leader of his followers in England and America. He died at Perth, Nov. 2, 1773. Notwithstanding some intellectual eccentricities, Glas was a man of strong character and sound scholarship. His works were published at Edinburgh in 1761 and at Perth in 1782–83. The thirteenth edition of his *Christian Songs* appeared at Perth in 1847. See SANDEMAN, ROBERT; SANDEMANIANS.

**GLASENAPP**, glä'ze-näp, KARL FRIEDRICH (1847–1915). A German philologist and writer on music. He was born at Riga, studied comparative philology at Dorpat, and in 1875 became professor of German literature at Riga. His principal work, *Richard Wagners Leben und Wirken*, is the most comprehensive biography of the master. The first volume appeared in 1876, the last (sixth) not until 1913. Two other important works are *Wagner-Lexicon* (1883) and *Wagner-Encyclopadie* (1891). Beginning with their foundation he was a frequent contributor to the *Bayreuther Blätter*. He also published some of Wagner's correspondence and wrote a life of Siegfried Wagner (1906).

**GLASER**, glä'zër, ADOLF (1829– ). A German author, born at Wiesbaden. For more than 22 years (1856–78) he continuously conducted *Westermann's Illustrierte Monatshefte* and he again was associated with that publication after 1882. His first success was the novel *Schlitzwang* (2d ed., 1879), which was followed by a series of historical novels, such as *Saronarola* (1883) and *Wulfhilde* (1885). His principal dramas are also chiefly historic: as *Galileo Galilei* (1861). He is favorably known as a translator of Dutch novels. His collected works were published in 12 volumes, 1889–92.

**GLASER**, EDUARD (1855–1908). An Austrian explorer, born at Deutsch-Rust, Bohemia. He studied physics, geology, and astronomy at Vienna and Prague, and afterward devoted himself to the study of Oriental languages, visiting Egypt and Tunis. In 1882 he observed a total eclipse of the sun at Sohag, Upper Egypt, and subsequently he made a trip to southern Arabia (Yemen, especially Jauf and Márib). In 1885 and thereafter he again made several tours through Arabia, and collected nearly 2000 manuscripts and numerous archaeological specimens, relics chiefly of the city of Márib, the capital



of the ancient Sabæan kingdom; most of these are in the Imperial Library, Vienna. Glaser's researches on the topography of Arabia, and on the epigraphy and dialects of the southern portion of the peninsula, are highly important. Besides contributions to scientific periodicals he wrote: *Mitteilungen über einige aus meiner Sammlung stammende sabäische Inschriften* (1886); *Skizze der Geschichte und Geographie Arabiens von den ältesten Zeiten bis zum Propheten Muhammad* (1889 et seq.); *Die Abessinier in Arabien und Afrika* (1895).

**GLASER, glä'zër, JULIUS ANTON** (originally **JOSUA**) (1831-85). An Austrian jurist and statesman. He was born at Postelberg, Bohemia, of Jewish parents, and was educated at Vienna and Zurich. In 1856 he was appointed professor in the University of Vienna. In 1871 he was elected to the Diet of Lower Austria, and from 1873 to 1879 he was a member of the Austrian Reichsrat. In 1871-79 he was Minister of Justice in the Auersperg cabinet, and subsequently was procurator general at the Court of Cassation, Vienna. He was one of the foremost jurists of his day, and aided greatly in the reformation of criminal jurisprudence in Austria. His principal publications are: *Das englische-schottische Strafverfahren* (1850); *Die Fragestellung im Schourgerichtsverfahren* (1863); *Zur Juryfrage* (1864; republished with the preceding work in 1879, under the title *Schourgerichtliche Erörterungen*); *Anklage, Wahrpruch und Rechtsmittel im englischen Schourgerichtsverfahren* (1866); *Gesammelte kleinere Schriften über Strafrecht, Civil- und Strafprozess* (2d ed., 1883); *Sammlung strafrechtlicher Entscheidungen des k. k. Obersten Gerichtshofs* (3 vols., 1872). Consult the sketch by Unger (Vienna, 1888).

**GLASER, OTTO C (HABLES)** (1880- ). An American zoölogist. He was born at Wiesbaden, Germany, and graduated in 1900 from Johns Hopkins University, where he received his doctorate in philosophy in 1904. He was an assistant in the United States Bureau of Fisheries and the North Carolina Geological Survey (1901-02), marine biologist of the Gulf Biological station (1903), demonstrator at the College of Physicians and Surgeons, Baltimore (1901-03), and taught biology at Woods Hole, Mass., in 1905-07, and at the University of Michigan after 1905, becoming assistant professor in 1908. His researches comprise investigations on the behavior of the white rat, behavior of the *Ophiura*, oyster culture, origin and physiology of nematocysts, cytology and embryology of *Fasciolaria*, and developmental energetics.

**GLASGOW, gläs'gó or gläs'kó.** A royal and parliamentary burgh, the industrial and maritime metropolis and the largest city of Scotland; after London and Birmingham, the largest city in the United Kingdom (Map: Scotland D 4). It is situated on the river Clyde, in the lower ward of Lanarkshire, and occupies chiefly the north side of the river, but has large and populous suburbs on the south side. The river is crossed by several bridges. Two of granite and one of iron are much admired for their light and graceful architecture. Two are suspension bridges and three are railway bridges. Below the bridges, ferryboats ply at all hours.

Glasgow is built for the most part on level ground, but in the north and northwest districts there are considerable elevations. Owing to the great number of factories and mills of all kinds,

the city has a somewhat dingy and smoky aspect; in other respects it has many attractions. The houses facing the river stand well back, leaving spacious thoroughfares on each side which afford full and noble views of the bridges, of several handsome street ranges and public buildings, and of the harbor with its funnels and forests of masts. Most of the leading streets run from east to west, parallel with the river, and almost all the streets, except in the oldest parts of the city, are laid in straight lines. The houses are generally lofty, and built of freestone, the floors of each tenement being usually occupied by separate families, entering by a common stair. In the fashionable quarters elegant residences prevail. The city may be divided into the eastern and western sections, separated by Buchanan Street; the former contains all that there is of antiquarian interest and many of the modern public buildings, while the latter is the more modern and fashionable quarter. The principal business streets are Argyll, running parallel to the river; Buchanan, running at right angles; and Sauchiehall, the main thoroughfare to the west-end residential section. George Square, the centre of the city, is adorned with an 80-foot fluted column surmounted by a statue of Sir Walter Scott, equestrian statues of Queen Victoria and the Prince Consort, and statues of Sir John Moore, James Watt, Sir Robert Peel, William Pitt, Thomas Campbell, Robert Burns, David Livingstone, Lord Clyde (Sir Colin Campbell), and Gladstone. About this square are clustered some of the most notable buildings in the city, such as the municipal buildings (in Venetian Renaissance style, opened in 1889), Merchants' House, Bank of Scotland, and the General Post Office. Among other public buildings are the Royal Exchange in Queen Street, in the Corinthian style, in front of which stands a colossal equestrian statue of the Duke of Wellington; the magnificent buildings of the university, erected in Early English style on Gilmore Hill and opened in 1870; the Institute of Fine Arts and the Corporation Art Gallery, both in Sauchiehall Street (the art gallery and museum are now housed in Kelvingrove Park). The cathedral, dedicated in 1197 and completed about the middle of the fifteenth century, was designed in the form of a cross, but the transepts were never completed. It is Early English in style, and is particularly noted for its beautifully proportioned and elaborately decorated crypt. The principal cemetery is the Necropolis, on a hill in the northern part of the city; here is a conspicuous Doric column erected (1824) in memory of John Knox.

Glasgow owes its industrial and commercial importance to its advantageous situation in the midst of a district abounding in coal and iron. Much of its prosperity is due also to its position near the mouth of the Clyde and the possession of a splendid harbor (206 acres). Over \$40,000,000 has been expended in the widening and deepening of the river, which is now navigable by vessels drawing 26 feet of water. In 1912 the total net tonnage entered and cleared, excluding coastwise vessels, was 5,226,000. In 1900 imports and exports of merchandise were valued at \$68,309,527 and \$90,006,810 respectively; in 1910, \$70,777,317 and \$143,961,057; in 1912, \$82,506,000 and \$162,817,725. The chief articles of export are woolen, cotton, and linen goods, machinery, millwork, and metal manu-



factures, coal, paper, chemicals, and whisky. The imports include largely raw products, such as wheat, corn, flour, sugar, wool, metal (especially iron) ores, timber, tobacco, and petroleum. The city is the chief centre of the shipbuilding industry of the world; the building of all kinds of machinery is next in importance, followed by cotton spinning and weaving. Calico printing, dyeing, and distilling and brewing should be mentioned. The famous St. Rollox Chemical Works, one of the largest of its kind in the world, has a chimney stack 435 feet high, a conspicuous landmark of the city. Loch Katrine, 42 miles distant and 364 feet above sea level, furnishes the water supply of Glasgow.

The government of the city is administered by a corporation consisting of 77 members, including the lord provost and 14 bailies. See paragraph on *Local Government* under GREAT BRITAIN.

Glasgow has led in the work of municipal reform in Great Britain. Its various improvements and great undertakings have been carried out by the corporation, which, under an act of Parliament, constituted itself in each case as a "trust," such as the Improvement Trust, the Police Trust, the Market Trust, the Navigation Trust, etc. For the purposes of practical work, the various trusts, i.e., the corporation in its several capacities, elect subcommittees, which have immediate supervision of the respective departments of city administration. Thus, the Sanitary Department, or Board of Health, is under the supervision of a corporation committee with subcommittees on cleansing and hospitals. It is administered by a chief inspector, assisted by some 150 inspectors, the work of each being highly specialized. The thorough organization of the Board of Health and the numerous other improvements of the city were necessitated by the extreme density of the population, and the consequent high rate of mortality among the working people. In 1865, the year marking the beginnings of the various public undertakings, the density of the population was very great—1000 per acre in certain districts. The average mortality in 1864 was 32.8 per thousand, and as high as 38.64 for a series of preceding years. The Improvement Trust, in cutting wide streets as well as in laying out new ones, in demolishing old buildings and creating vacant space, and in a good many other ways, helped to disperse the population over a wider area. In 1891 the boundaries of the city were extended; before extension, the average density was 92.5 to the acre, and after extension 55.5; in 1901, about 60 to the acre; in 1911, 62. Still, at the present day, a vast number of families occupy single-room dwellings (in 1911 there were 32,606 one-room dwellings and 75,536 two-room, out of a total of 163,057). The death rate has fallen to about 20. The birth rate averages about 33.

In addition to its work of prevention of disease, the Sanitary Department pays due attention to combating prevailing disease. Its two great municipal hospitals not only are models in appointment, but are built in a very attractive manner. Special buildings are provided for infectious diseases. The sanitary wash-houses are used for disinfecting the belongings of families whose members are afflicted with contagious diseases, the families themselves being entertained at the cost of the city in its "house of reception" while their homes go through the

process of disinfection and whitewashing. The Cleansing Department probably contributes as much to the health of Glasgow as the Sanitary Department. In addition to the usual sweeping and sprinkling of public streets, this department attends to the cleansing of private courtyards and passageways, the owners being assessed a slight tax to cover the expense. The street sweeping is done by machines at night. The litter swept up by men and boys during the day is deposited in covered iron bins, located under the surface of the streets at short intervals. There are three principal "dispatch stations," together with a number of minor ones, at which the city garbage undergoes a treatment which converts the greater part of it into manure. The city owns a number of farms for the utilization of that part of the refuse which cannot be marketed. To avoid contamination of the waters of the Clyde, the city's sewage is treated chemically in a special sewage plant, where it is made to precipitate all its solid ingredients, which are then made into "cakes" by powerful presses, and passed automatically into freight cars standing on the tracks below. Most of the cakes are utilized at the city's farm for raising fodder for the horses employed in the Cleansing and Street Railway departments. The water remaining after the precipitation of the solid ingredients is filtered, and passed entirely pure into the Clyde. All of these improvements, though originally involving a considerable outlay of capital, have more than paid for themselves.

The Glasgow police consists mostly of Highlanders, who are universally praised for their intelligence and efficiency. The police courts constitute a part of the police department. Justice is administered by the Lord Provost and the bailies. Half of the expense of the department is met by the general government.

The city possesses considerable and profitable real estate. There are some two dozen municipal tenements, which, though superior to the private houses of the same class, are built largely in undesirable localities, and thus utilize land which could not be disposed of otherwise.

The Glasgow municipal lodging houses are models in their line, and a boon to the poor. Although the charge is only seven to nine cents per night, they yield a revenue above all expenses, including interest. In 1896 the municipal family home was opened to accommodate families of widows or widowers who are obliged to be away from their children during the day. It contains all the necessary accommodations, including playrooms, playgrounds, and a nursery. There are nurses to take care of the children while their parents are at work. The charges are: for mother with one child, 76 cents per week; mother with two children, 92 cents. Board: breakfast, five cents; dinner, eight cents; tea, six cents. The public baths comprise five large establishments containing swimming pools, and accommodating on the average 1500 people per day. The public washhouses are fitted out with steam boiling apparatus, centrifugal machine driers, hot-air apartments, steam-operated roller mangles, etc. The charge for their use is four cents per hour.

The public lighting is done by the city. After having taken over the gas plant, the city went on improving it, at the same time reducing the cost of gas to consumers. Between 1869 and 1891 the population increased less than 30 per

cent, and the consumption of gas increased 170 per cent. From \$1.14 per 1000 feet in 1869, the price has gradually been reduced to 60 cents, without diminishing the net profits. In 1893 the city opened a large electric plant which has proved a great success, and lights not only streets and public buildings, but also private courts and stairways.

The water supply is under the management of the Board of Water Commissioners. In 1860 a new supply of water was introduced from Loch Katrine by means of a large reservoir covering an area of 86¼ acres, at a distance of 7 miles from the city and 300 feet above its general level. Subsequently the water supply was greatly augmented in part by raising the level of Loch Katrine 5 feet. With a steadily diminishing water rate the city has been able to meet not only all the expenses, including interest, but also to accumulate a sinking fund.

In 1894 the city took over the street-car system; by the terms of the original contract it did not have to pay for the plant, but received from the company a total sum of \$225,000 in rental money, and exacted another sum known as the renewal fund to keep the system in repair. Since then a new set of commodious cars has been introduced, certain extensions have been made, and the horse-car service has been replaced by a modern electric-traction system, all completed by the summer of 1901. After carrying out all of the improvements and charging the low rate of one cent for short rides and two cents for long ones, and after having reduced the hours of its employees from 14 (under the rule of the company) to 10, and advanced their wages, the city not only has managed to pay all expenses, including depreciation and interest on capital, but lays aside annually about \$300,000 in the sinking and general reserve fund.

Glasgow possesses a system of municipal markets, used, however, for wholesale transactions only. All slaughtering is done in the municipal abattoirs, yielding an income to the city. Under the name of the Clyde Navigation Trust, the city operates the harbor ferries, and holds a monopoly of all harbor services. The Mitchell Library, with 175,000 volumes, though founded by private persons, serves the purposes of a public library, and receives a grant from the city. In addition, the city has several minor libraries.

The schools are managed very successfully by the Glasgow School Board, as may be seen from the increasing attendance in public schools and the diminishing numbers in private ones. A system of fees divides the schools into three distinct classes, each aiming to furnish the same kind of education, but serving to separate the children of the rich from those of the poor. There are a number of technical schools, governed by a board of trustees, on which the Glasgow University is also represented. In addition to the University (see GLASGOW UNIVERSITY), there are the Glasgow and West of Scotland Technical College, St. Mungo's College, Anderson College, St. Margaret's College for Women, and the United Free Church College. The secondary schools include the High School, Glasgow and Kelvin-side academies, and the Hutcheson Trust schools. There are numerous hospitals and dispensaries, and three large, excellently appointed general infirmaries. Glasgow has a number of theatres and large concert halls. The

Royal Botanic Gardens near the Western Infirmary, with their large conservatories and fine collections of exotic and other plants, form a favorite resort for the citizens. Other large parks include the Glasgow Green (140 acres) on the Clyde, Kelvingrove Park, in the west end, Queen's Park (130 acres) on the south side, and Alexandra Park (120 acres). Glasgow is the seat of a United States consul.

The population of Glasgow in 1801 was 77,385; in 1821, 147,043; in 1861, 395,503; in 1881, 511,415; 1891, 565,839. The city limits were extended in 1891, the population becoming 658,198. In 1901 Glasgow had 761,742 inhabitants, and the area of the city was 12,561 acres; in 1911, 784,496 inhabitants, the area being 12,669 acres. The 1901 population of the 1911 area was 775,594, so that in the decade the increase on the same area was 8902; the natural increase is calculated at 91,540, showing a loss by migration of 82,638. Of Glasgow's area, 12,490 acres are reckoned as of Lanarkshire and 179 acres Renfrewshire. There are important suburbs, including the continuous burghs of Govan (1303 acres, pop., 89,605) and Partick (956 acres, pop., 66,849), and, in Dumbartonshire, the burgh of Clydebank (1330 acres, pop., 37,548).

Glasgow traces its beginnings in tradition to the little wooden church which St. Kentigern, apostle to the Scots, built on the banks of the Molendinar about 560 A.D. Nothing is known of the town for more than five hundred years, till David, Prince of Cumbria, the future King David I, in 1116, reestablished the see of Glasgow and rebuilt its church. Between 1175 and 1178 Glasgow was made a burgh, subject to its bishop, whose bailie and provosts administered its affairs. In 1300 Wallace defeated the English there, and five years later he was also betrayed to the English there. In 1450 it was made a regality; in 1611 it gained by charter the right of electing its magistrates, and in 1636 became a free royal burgh. Its university, modeled on that of Bologna, was founded by a papal bull in 1451. In the seventeenth century the town was a stronghold of Whiggism and the Reformed religion. The great commercial growth of Glasgow dates from the union with England in 1707. Enjoying equal freedom of trade with English ports, it quickly obtained a large share of the American trade, for which its position on the west coast fitted it especially. Glasgow became the chief emporium of the tobacco trade, and its Virginian merchants formed a local aristocracy remarkable for wealth and distinction. This trade was at length paralyzed by the American war; but sugar cultivation in the West Indies and the introduction of cotton manufacture opened up new paths to wealth. It was here that Watt invented his steam engine. To-day it is the centre of huge shipbuilding yards and numerous branches of the iron industry.

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*A British City: The Beginnings of Democracy* (New York, 1907); Marwick, *Early Glasgow* (Glasgow, 1911); Primrose, *Medieval Glasgow* (ib., 1913).

**GLASGOW.** A city and the county seat of Barren Co., Ky., about 100 miles (direct) south of Louisville, on the Louisville and Nashville Railroad (Map: Kentucky, E 6). It has the Liberty Female College. The city is in the oil region of the State; carries on a considerable trade in lumber, cattle, mules, and livestock; and its industrial establishments include lumber mills, large tobacco warehouses, handle factories, furniture and tobacco factories, etc. Pop., 1900, 2019; 1910, 2316.

**GLASGOW, ELLEN ANDERSON GHOLSON** (1874- ). An American novelist, especially interesting in her studies of Southern scenes and people, and not least in her pictures of the change in the South from the old order to the new. She was born at Richmond, Va., and was educated privately. Her works include: *The Descendant* (1897); *Phases of an Inferior Planet* (1898); *The Voice of the People* (1900-02); *The Freeman and Other Poems* (1902); *The Battle-Ground* (1902); *The Deliverance* (1904); *The Wheel of Life* (1906); *Ancient Law* (1908); *The Romance of a Plain Man* (1909); *The Miller of Old Church* (1911); *Virginia* (1913).

**GLASGOW UNIVERSITY.** One of the great seats of learning in Scotland. It was founded in 1451 by Bishop Turnbull, its foundation being ratified by a papal bull of Nicholas V. In 1460 James, first Lord Hamilton, bequeathed a tenement and four acres of ground to the Regents of the "Pædagogium," or college of arts, and the university was further endowed by Queen Mary, as well as by her son, James VI of Scotland, better known as James I of England, who issued a new charter to the institution. The chief prosperity of the university, however, dates from the middle of the nineteenth century. In 1864 the university buildings and adjacent lands were sold, and splendid new buildings were erected on a site overlooking the Kelvin River, at a cost of about £470,000. These were opened in 1870 and have been extensively added to since 1892. By acts of Parliament, in 1858 and 1889, the university has been entirely reorganized and is now a corporation consisting of a chancellor, rector, dean of faculties, principal, professors, and students. The university court consists of the rector, the principal, the Lord Provost of Glasgow, and various assessors, representing both city and university. The body administers the property of the institution, appoints and regulates professors, and acts as court of appeal from the senate, which consists of the principal and professors, and regulates teaching and discipline. The general council, consisting of various ex officio members and all masters and doctors, meets twice a year to revise the business of the university. It elects the chancellor, four assessors to the court, and, with the general council of Aberdeen University, returns one member to Parliament. The chancellor in 1914 was the Earl of Rosebery. There is also a students' representative council. The chancellor holds office for life; the rector, generally some man distinguished in politics or letters, is chosen triennially by the students. The duties of the latter are wholly honorary. The students retain many of the customs and rights of medieval universities, of which the election of the

rector is one. They are still divided into four "nations"—Glottiana (Lanarkshire), Transforthana (Scotland north of the Forth), Rothseiana (Bute, Renfrew; and Ayr), and Loudoniana (all others). In 1913 the number of students was 2770, including some 700 women. Women were first admitted in 1893 and Queen Margaret College was then handed over to the university by its trustees for their use. In 1913 the instructors numbered 164. In 1914 the rector was the Right Hon. A. Birrell, M.P. President Poincaré was chosen rector for 1915 by the student body.

The university grants degrees in arts, science, medicine and surgery, divinity, and law. It has a library of 210,000 volumes, an observatory, a botanical garden, besides many special collections of books, apparatus, and the great Hunterian collection of coins, medals, and anatomical preparations. An important feature of the university is the number of scholarships, exhibitions, and fellowships in its gift, among which the Snell exhibitions are the oldest and richest.

The University of Glasgow is rich in the number of distinguished graduates and teachers. Among them may be mentioned Bishop William Elphinstone, John Major, John Spottiswoode, Andrew Melville, James Melville, Robert Boyd, of Trochrigg, John Cameron, Zachary Boyd, Robert Baillie, James Dalrymple, first Viscount Stair, Gilbert Burnet (Bishop of Salisbury), John Douglas (Bishop of Salisbury), Dr. Robert Simson, Francis Hutcheson, Dr. William Hunter, Dr. James Moor, Adam Smith, Dr. Thomas Reid, Dr. William Cullen, Dr. Joseph Black, Dr. Matthew Baillie, Prof. John Miller, Thomas Thomson, Francis Jeffrey, J. G. Lockhart, Sir William Hamilton, Archbishop Tait, Prof. R. C. Jebb, Lord Kelvin, and Sir Joseph Lister. The four hundred and fiftieth anniversary of the foundation of Glasgow University was celebrated in 1901, and in the various publications of that celebration is to be found much valuable information regarding the institution. Consult also: Stewart, *The University of Glasgow* (Glasgow, 1891); Coutts, *A History of the University of Glasgow from its Foundation in 1451 to 1909* (ib., 1909); and the *Glasgow University Calendar*.

**GLASH'AN, JOHN CADENHEAD** (1844- ). A Canadian educator and mathematician. He was born at Ellon, Aberdeenshire, Scotland, and was brought by his parents to Upper Canada (Ontario) when nine years old. He was educated at the public schools, at the provincial normal school, and at Toronto University. In 1864 he became a teacher in the Provincial Model School, Toronto, and in 1871 and 1876 respectively was appointed inspector of schools for Middlesex County and for the city of Ottawa, continuing in the latter office until 1910. In 1895 he was made a member of the board of civil-service examiners. In 1902 he was elected a fellow of the Royal Society of Canada. He contributed articles on mathematical subjects to various journals and devoted special attention to the history of mathematics. He is the author of an arithmetic for public schools, an advanced arithmetic for high schools, and also, with G. A. Wentworth and J. A. McLellan, of *Algebraic Analysis* (1889).

**GLASPELL, SUSAN** (Mrs. GEORGE CRAM COOK) (1882- ). An American author, born at Davenport, Iowa. She graduated from Drake University and also studied at the University

of Chicago. For a time she was State House and legislative reporter for the *News* and the *Capital*, daily newspapers of Des Moines, Iowa. She married George Cram Cook in 1913. Besides her contributions to magazines, she is author of *The Glory of the Conquered* (1909), *The Visioning* (1911), and *Lifted Masks* (1912)—novels that are intensely emotional and distinguished by their vivid realism and imaginative power.

**GLASS** (from AS. *glæs*, Icel., OHG. *glas*, Ger. *Glas*; connected with Icel. *gler*, AS. *glær*, amber, and ultimately with Eng. *glare*). The use of glass came to the West from the East, and for that reason there is a diversity of names among the Indo-European nations. In Greek the usual word is *βαλος*, *hyalos*, of which the etymology is uncertain. In Latin the word is *vitrum*, which also means *wood*, used for its blue dye—a fact which suggests that the earliest glass known to the Romans was in the form of blue beads. Among the northern peoples the original name of the amber (OHG. *glas*) was transferred to the new material and has given rise to the English *glass*. The French (*verre*) and most of the other Romance languages have kept the Latin name.

The manufacture of glass was known to the Egyptians at a very early date. Tombs of the fourth and fifth dynasties (c.4000 B.C.) show glass blowers at work, and glazed pottery in the form of beads occurs in prehistoric times, though true glass first appears later in the form of opaque "paste" and finally as transparent glass. The oldest example of dark-blue glass is a pendant found at Naqada, which seems to date from the seventh dynasty, though no other specimens of this manufacture are known before the eighteenth dynasty. A wall painting of the eleventh dynasty, at Beni Hassan, is commonly interpreted as representing accurately the processes of glass blowing, but Dr. Flinders Petrie believes that some metallurgical process is depicted in which reeds tipped with lumps of clay were used. The fullest information about the processes and materials used by the Egyptians is furnished by the discovery of the glassworks at Tell el-Amarna, belonging to the eighteenth dynasty. Here were found fritting pans in which the first melting of the substances took place and also many imperfectly fused frits. The ingredients used were silica, lime, alkalies, and copper carbonate; but the exact proportions needed to secure a given color do not seem to have been known, and the exact tint produced must have been largely a matter of chance. They did know, however, that river sand, from the presence of iron, gave a green tinge, and to avoid this used crushed quartz pebbles. After the mixture had been fused until the colors began to appear, it was formed into cakes of paste, and these were again heated until the proper tint was reached. These cakes were fused in crucibles and allowed to cool in them, so that the impurities rose to the surface or settled at the bottom. The crucibles were then broken away, and the impure glass at the top and bottom chipped off, leaving a lump of glass, which was then broken up and softened so that it could be rolled into thick rods. These rods were then drawn out into slender rods or hollow tubes or rolled into flat strips, and these rods or ribbons were used by the glassmaker to produce beads, vases, or inlaid work. It is noticeable that, in the view of Dr. Petrie, the *vases*

from this site were not blown, but were formed by coating a core of sand with melted glass, and pressing out the foot and lip by hand, while the decoration was produced by rolling in threads of colored glass. (Consult Petrie, *Tell el-Amarna*, London, 1894.) Vigorous exception, however, has been taken to this view by other scholars, who hold that the facts on which Dr. Petrie based his view are entirely compatible with the belief that the vases were blown. In general, glass was used for the manufacture of small objects, and especially for the imitation of precious stones, in which the later workmen attained extraordinary skill. Cutting and engraving were also early practiced. Apart from these independent uses of glass, it was very largely employed for inlaying, while an enamel or glaze on clay, stone, or wood was a favorite form of decoration from early times. A very large proportion of the scarabæi, amulets, and small ornaments found in Egypt or exported to foreign parts are of various earths covered with a vitreous glaze, producing the ware incorrectly termed "Egyptian porcelain." However empirical the methods of the Egyptians, there can be no doubt of the technical skill attained by them, and even in Roman times the Alexandrian glassworkers maintained their preeminence. It was not till the Hellenistic period that value seems to have been set on clear glass, for, though clear glass was known earlier, it is certain that Egyptian taste valued only the highly colored varieties.

**Phœnicia.** Tyre and Sidon were celebrated for their glass, and Pliny (*Hist. Nat.*, 36, 190) locates the invention of glass at the mouth of the river Belus in Syria. His story is that the crew of a ship laden with nitre landed at this point, and when preparing to cook their food found no stones on which to rest the kettle. They therefore used lumps of nitre from the ship, and as these were fused with the fine sand a stream of liquid glass flowed out. Glass was certainly known long before the Phœnicians manufactured it, and the heat of an ordinary fire would be quite insufficient to fuse glass; but the fact remains that the river Belus was always an inexhaustible mine for ancient glassworkers, and modern travelers still describe the white sands heaped on each side of the stream. The glass factories of Tyre and Sidon were among the most noted of ancient times and remained conspicuous under the Roman emperors. Sidon is credited with the invention of mirrors. She certainly produced the best in the world in her time and knew the value of manganese in making glass clear. The artisans of this city used the blowpipe, the lathe, the graver, and the casting plate with splendid results. In the view of some scholars, the Phœnicians did little more than carry on the processes learned by them from the Egyptians; they were not great artists, but skillful fabricators and traders, and, as a result, their glass is found throughout the Mediterranean. Other scholars, however, attaching great weight to Pliny's account, regard Syria as the birthplace of glassmaking and think that the Egyptians derived their knowledge of it from Syria; they believe that thus we can adequately explain the fact that the glass industry, when first it meets us in Egypt, is fully developed. The date of any single piece is usually hard to determine, nor is it of great importance, as there are but slight variations in style at different periods and little advance

in technical skill. Indeed, it is often impossible to say whether a specimen is of Phœnician or Egyptian manufacture.

**Assyria and Babylonia.** Though glass is scarcely found in the Mesopotamian ruins, glazed or enameled bricks, statuettes, and small objects are numerous. Transparent glass was also known, and a fine example is the bowl of transparent green, now in the British Museum, bearing the name of King Sargon (722 B.C.). This bowl is not blown, but turned and cut from a lump of cool glass. It seems probable that this and other objects of transparent glass are importations from Phœnicia.

**Persia.** The use of enameled bricks for wall decorations was continued by the Persian kings, and the Louvre contains parts of the friezes representing lions and the royal guard which adorned the palace of Xerxes at Persepolis. The beautiful enamels of Persia are famous, and her delicate, lacelike porcelain, filled with transparent glass, is celebrated as Gamberware. In the Paris Bibliothèque is the famous cup of Khosru I, King of Persia (532 A.D.), a shallow bowl of crystal with the monarch's figure in relief in the central medallion, encircled with disks of red and white alternating with green, the whole glass ornamented in relief and bound with gold.

**China and India.** The Chinese claim that glass and even lenses were known and manufactured by them as far back as 2000 B.C., but the claim is most improbable, and it is not likely that the art was introduced before the Christian era. Modern Chinese glassworks imitate agate and other stones beautifully. All their glass is made from pulverized quartz, as in Japan and India. The Hindus, Siamese, and Chinese have from time immemorial placed lumps of glass on the high parts of their buildings to avert lightning. Indian enamelers have been celebrated from ancient times, but they work with simplest processes. The mosaic industry of Agra originated in the Taj Mahal, for which Italian artists were imported. Glass has never been used for windows in the Far East, except rarely in palaces, and to the present day oiled paper is the usual glazing throughout China, the palace windows being generally filled with mother-of-pearl or tortoise shell.

**Greece.** Homer does not mention glass (unless the word *kyanos*, *kyanos*, denotes a blue-glass paste, such as decorated the alabaster frieze found at Tiryns), but excavations have shown that beads and such small objects were known in Greece during the Mycenaean period, though no fragments of glass vessels have been discovered. It seems probable that these objects were imported, as there is no trace of the manufacture of glass on Greek soil, even in much later times. The excellence of the Greek ceramic ware made glass of less importance. Even the word *yalos* is not used in the sense of glass before Aristophanes (425 B.C.), and then it refers to vessels used at the Persian court. In later time undoubtedly Greek artistic training exercised a powerful influence upon the glassmakers, some of whom bore Greek names, but the industry never became Hellenic, and Egypt, especially Alexandria, and Syria remained until Roman times the chief sources for fine glass.

**Rome.** In Italy glass first appears at the very beginning of the iron age, in the cemeteries of the Villanova (q.v.) type, naturally in the

form of beads and other paste ornaments. Glass bowls and bottles, however, are found in Etruscan tombs, and with the extension of the Roman power the use of glass increased enormously. Not only was glass imported from the old seats of this industry, but the manufacture was introduced into Italy, and thence into the provinces of Gaul, Spain, and Germany. Here, as in Italy, glass and iron had been introduced together, but only ornaments, beads, amulets, etc., were purchased from traders. Under the favorable conditions the industry flourished greatly, and glass became so cheap that ordinary cups or platters were sold in Strabo's time for a farthing. On the other hand, the expensive and beautiful vessels, according to Pliny, had almost driven out the use of gold and silver. The absence of fine porcelain led to a much more extensive use of glass than in modern times; and by Christian times glass was used even for windowpanes. It was used, too, in pavements and in thin plates as a coating for walls. Glass was used in many colors, and the skill of the ancient artists produced works not surpassed or even equaled in later times. In variety of shapes and in some points of technique the Venetians surpassed the ancient Romans; the special merit of the ancient workmen is in the beauty of the coloring and the skill with which the various threads or layers are combined, producing the effect of onyx and agate. The glass was *blown*, *cast*, *pressed*, *ground*, and *cut*. It was used for drinking cups, flasks, bowls, and other vessels, for mosaics, small ornaments of various kinds, and especially for imitations of precious stones, which in many cases were finely engraved as intaglios or cameos. Two methods of decorating are of special beauty. In one the workman blew the glass in two layers—the inner of a dark color, usually blue, and the outer of white. The outer layer was then cut away on the wheel, leaving the design in white relief on the dark background, as in a cameo (q.v.). The most famous example of this technique is the Portland Vase (q.v.) in the British Museum, though another fine specimen is in Naples, and fragments are very common. The second method is represented by but few specimens, all apparently egg-shaped cups without a foot. The vessel is enclosed in a network of rings of glass which are attached only by slender filaments to the surface of the cup. They seem to have been produced by cutting away the outer surface of the original vessel—an exceedingly delicate and tedious process, though some authorities hold that the outer network has been applied while soft and worked out with the forceps. Consult especially Fröhner, *La verrerie antique* (Le Pecq, 1879), an account of the Charcot collection, with a full historical introduction and numerous fine colored plates. More popular is Wallace-Dunlop, *History of Glass in the Old World* (London, 1883). A very elaborate work is Kisa, *Das Glas in Altertum* (3 vols., Leipzig, 1912), dealing with the origin of glass-making, glass in Egypt, Phœnicia, Syria, Greece, Rome, and its provinces, etc.

**Byzantium.** Constantine, on transplanting his capital to Byzantium (330 A.D.), selected the best artisans in glass and not only gave them studios in a quarter of the city called "glass-making quarter," but caused them to be exempt from the tax levied by previous emperors. Accordingly glassmakers flocked from fallen Rome, carrying the fame and the skill of the Imperial

city to the East, and Byzantium supplied all Europe with *verre de luxe* until the rise of Venice. Factories were reestablished in Greece, Macedonia, Phœnicia, and Alexandria, and after the Arab conquest they continued to be the sole sources of artistic glass through the Middle Ages. The early Byzantines followed classic models, often badly, but later a Byzantine school arose which prevailed throughout Europe until the thirteenth century. Mosaic art, under the impetus of Christianity, was developed to its greatest glory for mural decoration, as the Byzantines believed and demonstrated that "mosaic is the only painting for eternity." Their world-renowned specimens at Ravenna (440 A.D.) are superior to those of the Romans. In the famous St. Sophia are mosaics made in the sixth century. On the lower walls these mosaics are of marble, and of glass cubes or tessere on the upper walls and ceiling. These and its colored windows caused Justinian, its builder, to say, "I have surpassed thee, O Solomon." The church of the Transfiguration, Mount Sinai, is adorned with precious Byzantine mosaics of the seventh and eighth centuries. The Byzantine churches were usually lighted by a series of small windows around the base of the dome. Some of the original plates of cast glass still remain at St. Sophia. Colored window glass is not mentioned till towards the end of the eighth century. A common method of inserting it, which is still practiced in the East, was to perforate slabs of marble, or even the plaster, in patterned openings and place the glass in these.

One of the terms of peace at the beginning of the eighth century between Caliph Walid and Justinian II was that the latter should furnish a quantity of mosaic for his mosque at Damascus. A series of Byzantine mosaics extends from Constantine to Charlemagne. So late as the eleventh century, Pope Victor III sent to Constantinople for workers in mosaic. Imitation stones were also made wonderfully well there. The blue cup at Monza (600 A.D.), 3 inches in diameter, said to be made of a single sapphire; the celebrated emerald table captured at Toledo in the fourteenth century, long believed to be cut from a single emerald, inlaid with gold and precious stones, and valued at 100,000 dinars; and the famous *Sacro Catino* of Genoa, a shallow dish which passed as one of the most sacred relics of Christendom, the veritable "Sangraal," the ransom of a captive king, and supposed to be cut from an emerald until pronounced green glass, in 1761, by a French chemist—were all from Byzantine factories. The precious sacrament cups of glass, used in the church service, were theirs. They made the glass medallions circulated as test weights for money throughout the large estates of the Fatimite princes, which have been mistaken for coins. These were abolished in 888, but Venice continued to make glass weights in 1279, as the old Greeks had done. From Byzantine centres the Crusaders brought back into Europe the manufacture of glass, and it is probably from this source that Venice received its early impulse and first lessons in glassmaking.

**Venice.** Refugees in Venice made glass as early as the fifth century, the abundance of excellent sand and alkaline sea plants facilitating the industry. St. Mark's, built in 1159, gave an impetus to mosaic work on the spot, and the taking of Constantinople (1204) drove many Greek workmen to the asylum of Venice with

Byzantine secrets. The interior walls of this church are entirely covered with glass mosaics, representing the principal events of biblical history. The work on these mosaics extended over a period of 250 years. The wonderful color effect and beauty of these mosaics have been eloquently described by Ruskin. With the rise of the Italian painters, mural painting took the place of mosaics for wall decoration, and no mosaics of importance were made after the fifteenth century. But in the meantime the Venetians had turned their attention to the production of ornamental glass and guarded the secrets of its production with the most jealous care. In 1275 the Council of Venice prohibited the exportation of glass materials. The fear of fire abolished the furnaces, in 1291, from Venice proper to the outlying island of Murano, where the artists formed a small republic and have flourished ever since. The fame of Venetian glassmakers led other countries to tempt them away, but the Council of Ten jealously guarded the secrets of Venetian wealth. No stranger could learn the art. Any workman carrying his skill to another country was followed and ordered back. If he refused to come, his relatives were imprisoned. If he persisted, an emissary was dispatched to kill him. A wandering glassmaker called Paoli was tracked to Normandy, where he was stabbed with a dagger on which was written "Traitor." But the Venetian police had no power in Murano, and that island had its own codes and magistrates. Nobles gave their daughters in marriage to glassworkers, and the children were counted of the nobility. The shops of Murano formed, in 1495, a magnificent street a mile long, where every conceivable object was fashioned. The furnaces were small, a few workmen about each, which explains the diversity of design and the scarcity of pure glass, such as only long fusion in large furnaces can produce; but nowhere in the world could the precious products of Murano be matched. The vases and cups were royal presents to every sovereign. Their dishes displaced gold. Many of their wares were in patterns like madrepora coral. Their *mille fiore* was a starry mosaic of white threads combined in a blue ground. A favorite style imitated the pulp of an orange. *Vitro de trina* ware was made of twisted rods of opaque white in clear glass, and most delicate of all was their *latticei*, a lacelike network in exquisite designs. They also secured wonderful effects in mosaic, imitation gems, and cameos. All of these were simply repetitions or extensions of wonders done ages before by the Romans, Greeks, and Egyptians, which had since become lost arts, and all the lightness and wealth of color of ancient glass were exquisitely copied in an endless variety of fantastic forms. Fishes, lions, dragons, etc., were made to assume grotesque effects with the colors of different wines. They blended two sheets of color into one. They invented aventurine and far surpassed their masters in reticulated glass. About 1300, Murano artists conceived of covering plates of glass with an amalgam of tin and mercury, and their mirrors became proverbially fine. Marco Polo prompted them to manufacture beads for African trade. These beads became very popular, and enormous numbers of them were made, so that now, wherever the trade of the Middle Ages penetrated, they may still be found. These beautiful beads contrast strangely with the vulgar and glittering productions that

are now made for the similar purpose of trade with African and Indian tribes. In the early fifteenth century Panfilo Castaldi, a Venetian engrosser of deeds, made movable glass types and printed from them, and tradition says that John Faust, his friend, visited his scriptorium. Modern spectacles were invented by Salvino d'Armati, of Florence, according to the statement on his tombstone (1317). At the beginning of the seventeenth century there were 300 glasshouses in Murano, but at the commencement of the nineteenth century all were gone except a small mosaic factory. The art, however, was not allowed to die out entirely, but was cherished by a few workmen, one of whom, Radi, undertook the work of restoring some of the mosaics at St. Mark's. Salviati, an Italian lawyer, assisted in the Radi enterprise, and with the aid of English capital two sets of workshops have been established where ancient methods and objects such as mosaics are skillfully copied, and new and beautiful work is also done. The Venetians excel in glass novelties, such as mirrors, beads, tableware, bric-a-brac, and aventurine. Their glass is very soft so that it can be spun, woven, or otherwise fashioned into the daintiest designs. In the production of a single piece, it is said, the glass may be reheated 50 times.

**France.** The factories of Poitiers were active during the Roman and Frankish periods, survived the Norman invasion, and were left as a legacy to the gentlemen workers of the Middle Ages. Ruins of glass vases abound in the Poitiers territory, and such town names as Vieille, Verrières, Voirie, Verrines, come from their glassworks. The ancient cemeteries of Poitiers and La Vendée yield a rich harvest of glass, and fully 20,000 vases have been found at Terre-Noire, Bordeaux. The Imperial factory of Fron-tincennes, at Forêt-Eu, cradle of all the later Norman glassworks, is supposed to have been founded in the second century and is surely the oldest in the world. The beautiful Roman glass seen in the museums of France is thought to be of native manufacture. The Merovingian ornaments have a peculiar dynastic mark in the thin gold threads dividing differently colored layers. In 677 many Greek workmen were called to France. Normandy was the first country to give privileges to glassworkers. In the tenth and eleventh centuries four noble families received the special prerogatives of glassworkers, and these were confirmed by successive kings until the eighteenth century. Factories in other parts of France were established by gentlemen from Normandy, and the Crusaders brought back many improvements in glassworking. Charles V gave all glassmakers exemption from taxes, and later kings extended this privilege as well as permitting noblemen alone to labor at this art. In 1338 Humbert, Dauphin of Viennois, granted a portion of the forest of Chamborant to a glassmaker to establish factories there, provided he should furnish him 3000 pieces annually. M. Jaquin, in 1656, invented the imitation pearls which are made by lining the beads with fish scales, instead of the old quicksilver lining, copying the uneven shapes of pearls in perfect mimicry, of all shades. Glass painting was first developed, if not invented, by the French, the earlier artisans being content with mosaic. Painted glass windows are said to have originated in the school of Limoges, about 800, where a Venetian colony was planted. In all the old

French churches the glassmaker's art was conspicuous. The windows of Saint-Denis (rebuilt for the sixth time in 1108) are pronounced the oldest mosaic pictures in France. In 1665 Colbert tempted away 18 Venetian workmen, with their secrets, and founded a mirror factory in Paris, which in 1693 was enlarged and transferred to Saint-Gobain, where the manufacture still continues on a grand scale. About this time Thévert rediscovered the *casting* of plate glass, making plates 84 by 50 inches. All previous plate glass had been produced by *blowing* and was therefore limited in size. For over 100 years cast plate glass was to be obtained only from these makers. In 1740 a factory for French cylindrical window glass was established, with German workmen, at Saint-Quirin, which became the parent of the modern French, Belgian, and English plate-glass works. In 1823 D'Ar-tiques established the world-renowned "crystal-lerie de Baccarat."

**Germany.** Roman glass has been found in abundance along the Rhine, a fact which indicates the early date of local manufactures. The Frankish jewels were of Teutonic origin. In the ninth century, probably, the Germans taught glassmaking to the northern nations. The bishops of early Germany specially encouraged glassmaking to dispel pagan idleness with Christian industry. The inhabitants of Teger-nsee, Bavaria, have lately held a festival in honor of the invention of glass painting, which, they claim, dates from the windows of the abbey in that town, made in 999. For a long time painted glass and frescoes were the only library of the people. Lehmann, of Prague, reinvented the casting of glass in molds in the seventeenth century. In 1609 cut glass was first made by him, and it soon outrivalled Italian glass. Cut glass had been made by the ancients, but the art had probably been lost. Bnati, a glass-maker of Murano, worked three years in a Bohemian glasshouse, as a porter, to learn its secret, and returned in 1739 to obtain a patent for Bohemian cut glass. Henry Schwanhard, in 1670, invented the etching of glass with hydro-fluoric acid. The Electoral glassworks, near Potsdam, established in the eighteenth century, became famous for their gold ruby, invented by Kunckel (1679). Mirror making was introduced from France in the eighteenth century.

**England.** Great difference of opinion prevails regarding the origin of glassmaking in Great Britain, some claiming that it was established before the Roman Conquest, and others as late as the sixteenth century. French workmen, in 699, were brought over to glaze St. Peter's, York. Benedict established French glassmakers at Wearmouth, 675, for the building of his church; but for centuries glassmaking languished in Britain. Henry III had but one glass drinking cup, which he specially prized. France taught England the secrets of glassmaking. The oldest painted windows in England are those of 1174 in the choir of Canterbury Cathedral, which are as French as those in Saint-Denis. As late as the sixteenth century oiled linen was the usual window material, and a century later the royal palaces of Scotland had only the upper rooms glazed. In 1677 the Duke of Buckingham brought glassmakers from Murano to Lambeth to manufacture crystal vases, looking-glasses, and coach windows. The revocation of the Edict of Nantes (1685) sent many glassmakers to England, and the manufacture



speedily improved. Early in the seventeenth century the greatest of modern glass inventions was achieved in England, the making of lead flint, producing brilliant glass, which was impossible for earlier makers. The famous plate-glass works of Ravenhead were established in 1771. Towards the close of the nineteenth century the art of making glass mosaics was revived in England, largely through the efforts of Sir W. B. Richmond.

**United States.** Prior to the European colonists the only glass known in America was the "obsidian" volcanic glass. In 1608 some glassmakers were among the artisans brought to Jamestown, Va., but the craze for tobacco interfered with their industry. In 1621 several Italian glassworkers were imported to manufacture beads for the Indians. In 1639 a glasshouse was erected at Salem, Mass., and William Penn alludes to a Quaker glasshouse in 1683. A glassmaker, Jan Smeedes, received an allotment of land on Manhattan Island, and the business which he carried on gave the name "Glassmakers' Street" to the present South William Street of New York. In 1754 a Dutch gentleman, Bamber, built glassworks in Brooklyn, N. Y., and the first bottle blown by him, bearing the name and date, is in the collection of the Long Island Historical Society, Brooklyn. Glassboro, N. J., was founded by a colony of German glassmakers, who moved there in 1775. In 1787 the Massachusetts Legislature gave to a Boston glass company the exclusive right to make glass in the State for 15 years. This is said to have been the first successful glass factory in the United States. Pittsburgh, Pa., first made glass in 1796, and is still a most important glassmaking centre. At the very beginning coal was used instead of the traditional wood fuel. This, with the abundance of excellent sand in the adjoining rivers, gave the industry a phenomenal development there, which has been increased by the substitution of gas and oil fuel. In 1827 pressed glass was invented by a carpenter of Sandwich, Mass. With the discovery of a cheaper and better fuel, in the form of natural gas, the centre of glassmaking moved west of the Alleghenies, where it still remains. As natural gas failed, petroleum was substituted and proved an excellent fuel. By the close of 1880 the census shows that the glass industry of the United States had been brought to a

very extensive and prosperous condition. There were then 211 factories, employing 24,177 men, sending out an annual product worth \$21,154,571. In 1890 the number of factories had increased to 294, and the product to \$41,051,004, and in 1909 there were 363 establishments and the product was \$92,095,203. Within recent years artistic glassware of great beauty has been produced in the United States, notable examples of which are the stained-glass windows and mosaics of leading makers and such as La Farge and Tiffany and the famous "Favrille" glass of the Tiffany Company of New York. The United States still imports more glass than she exports, the exports being largely that peculiar product of Yankee ingenuity, pressed glass.

**VALUE OF GLASS AND GLASSWARE IMPORTED INTO AND EXPORTED FROM THE UNITED STATES**

FISCAL YEAR	IMPORTS Total value	EXPORTS Total value
1914	\$8,191,133	\$3,729,623
1913	6,537,293	4,193,642
1912	6,210,625	3,494,153
1911	6,881,891	3,246,391
1910	6,553,764	2,805,401
1900	5,037,931	1,936,119
1890	7,411,343	882,677
1880	5,221,511	749,866
1870	4,157,643	530,654

**Chemical and Physical Properties.** Chemically any vitreous compound is called glass, but commercially glass is a fused mixture of two or more metallic silicates, and is often named from the predominant base, as "soda glass," "potash glass," "lime glass," and "lead glass." The essential ingredients are silica and alkali. *Flint glass* is a mixture of the silicates of lead and potassium; *Bohemian glass*, of the silicates of potassium and calcium; *plate or sheet glass*, of the silicates of calcium and sodium; *bottle glass* is a mixture of the silicates of sodium, aluminium, and calcium; *Venetian glass*, of sodium, potassium, and calcium. Sodium, potassium, calcium, and lead are the bases that form almost all glasses. To obtain the silica, sand is now generally used—river or sea sand sufficing for cheap grades in spite of the impurities, but for fine qualities the sand is quarried. American sand is pronounced by experts superior to English and French. The principal deposits

**GLASS INDUSTRY OF THE UNITED STATES, 1869 TO 1909**

(From Thirteenth United States Census of Manufactures)

GLASSMAKING	NUMBER OR AMOUNT				
	1909	1899	1889	1879	1869
Number of establishments . . .	363	355	294	169	154
Persons engaged in the industry . .	72,573	55,256	*	*	*
Proprietors and firm members . . .	87	170	*	*	*
Salaries employees . . .	3,575	2,268	*	*	*
Wage earners (average number) . .	68,911	52,818	44,892	24,177	15,367
Primary horse power . . .	123,132	52,943	28,241	5,672	1,857
Capital . . .	\$129,288,384	\$61,423,903	\$40,966,850	\$18,804,599	\$13,826,142
Expenses . . .	85,374,185	50,196,736	36,527,203	*	*
Services . . .	44,293,215	29,877,086	22,118,522	9,144,100	7,589,110
Salaries . . .	4,993,591	2,792,376	*	*	*
Wages . . .	39,299,624	27,084,710	*	*	*
Materials . . .	32,119,499	16,731,009	12,140,985	8,028,621	5,864,365
Miscellaneous . . .	8,961,471	3,588,641	2,267,696	*	*
Value of products . . .	92,095,203	56,539,712	41,051,004	21,154,571	18,467,507
Value added by manufacture (value of products less cost of materials) . . .	59,975,704	39,808,703	28,910,019	13,125,950	12,603,142

\* Comparable figures not available.



are in Massachusetts, Pennsylvania, West Virginia, Illinois, Missouri, Ohio, Indiana, New Jersey, New York, and Maryland, but good sand is abundant all over the United States.

Ancient glass was commonly a potash glass, and the inferior potash, made from the ashes of plants and sea plants, was used until succeeded by soda ash, carbonate of soda made from salt by Leblanc's prize discovery of 1792, which opened a new era in glassmaking. Since 1875 "salt cake," sulphate of soda, has been largely used, producing a harder glass of a bluish color, while the carbonate of soda glass is softer and yellowish. Lime, next to silica in importance in producing toughness, is a modern discovery. Of old, it was used sparingly as a cheap substitute for soda and potash; now, with improved facilities, it produces "lime flint," unequaled for lightness and beauty in common wares. It is used in the form of carbonate of lime or slaked lime or calcium hydroxide. Lead oxide (litharge) began in the seventeenth century to produce the heaviness and brilliancy of the English flint glass now made in every industrial country. Another oxide of lead, called red lead, is also used in modern glass and is said to be preferable on account of its excess of oxygen. Other ingredients, as barium, zinc, boron, and lithium, are used in special glasses. Manganese is introduced in modern glass as a decolorizer, to modify or neutralize the greenish tint produced

the following equation:  $2(\text{SiO}_2 + \text{Na}_2\text{SO}_4) + \text{C} = 2\text{Na}_2\text{SiO}_3 + 2\text{SO}_2 + \text{CO}_2$ .

The proportions of the ingredients differ widely among various establishments. Potassic silicate is colorless and contributes brilliancy and fusibility; sodic silicate is also bright and fusible, and makes a yellow tint with green so that potash must be used; plumbic silicate increases the fusibility, ductility, and brilliancy of glass. The greatest care must be taken in regulating the various constituents entering into the glass, as an excess or deficiency of a material will have a most deleterious effect on the glass, either in its appearance or in its physical properties. Of these, aside from its transparency, homogeneity, and strength, specific gravity is important. If there is too much sand, it is impossible thoroughly to melt the glass, and it is full of stones, seeds, strings, and other imperfections. The specific gravities of various kinds of glass are as follows: window glass, 2.50 to 2.70; plate glass, 2.40 to 2.50; bottle glass, 2.60 to 2.70; lead-flint glass, 2.80 to 3.25. Hydrofluoric acid is the only acid known which will dissolve glass. Glass is slightly acted on by alkaline solutions, by light, air, and boiling water. It is usually transparent or at least translucent. The most important property of glass, however, is the condition of viscosity, intermediate between solidity and liquidity, which it assumes when the ingredients

#### CHEMICAL COMPONENTS OF DIFFERENT VARIETIES OF GLASS

(From *The Mineral Industry*, 1900)

COMPONENTS	WINDOW GLASS					PLATE GLASS				LEAD FLINT (CUT GLASS)			
	American	Belgian	German	English	French	American	French	Belgian	English	American	Belgian	French	English
SiO	72.26	69.48	72.68	71.40	69.65	71.2	72.1	72.4	78.64	63.76	53.70	52.41	51.41
Al <sub>2</sub> O <sub>3</sub>													
Fe <sub>2</sub> O <sub>3</sub>	1.42	2.59	1.06	1.90	1.82	1.0			2.68	90	1.07	.96	....
CaO	13.34	15.40	12.76	12.40	13.31	14.2	12.2	13.2	6.09	MgO 31	0.59	.77	....
MgO		.26	.26							PbO 21.93	34.91	35.24	37.4
Na <sub>2</sub> O	14.01	14.55	13.24	15.00	15.22	13.9	15.7	14.4	11.63		9.12	10.37	
K <sub>2</sub> O									1.34	12.16	.30		9.4

COMPONENTS	LIME FLINT (PRESCRIPTION)				GREEN BOTTLE			CHAM-PAGNE	JENA				STRASS
	American	English	German	French	American	German	French	French	Thermometer glass	Combustion tube	Verbund-glass	Chemical	French
SiO	73.96	%	75.61	69.6	69.82	60.4	63.34	61.90	67.30	66.61	71.95	74.07	38.2
Al <sub>2</sub> O <sub>3</sub>						10.4	4.72	4.41					
Fe <sub>2</sub> O <sub>3</sub>	.44	...	1.01	5.2	2.58	3.8	4.42	1.85	2.50	3.53	5.00	1.20	1.0
CaO	13.94	...	7.38	13.0	7.82	20.7	21.34	17.95	7.00	11.81	...	8.25	..
MgO	.41	...				.6		6.38			...	...	..
ZnO	.18	...	4.84								...	...	53.0
K <sub>2</sub> O		...	11.39	8.0	1.50		2.01	1.13			...	7.47	7.8
Na <sub>2</sub> O	10.85	...		3.0	18.28	13.2	4.17	0.16	14.00	6.56	11.00	8.63	...
ZnO		...							7.00	1.30		...	...
BaO		...								2.20		...	...
B <sub>2</sub> O <sub>3</sub>		...							2.00	7.99	12.00	...	...

by iron, which is an unwelcome ingredient of nearly all materials. Arsenic is used also as a decolorizer and also as a flux, while charcoal or carbon is employed when salt cake is used to complete the reaction, this being indicated by

of which it is composed have been thoroughly fused and are maintained at the proper temperature. In this semiliquid state it may be blown into any hollow form like a bubble, spun into the finest thread, or pressed or cast into any

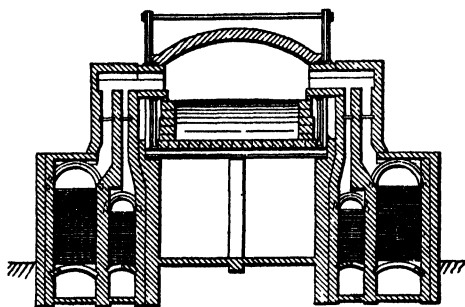
desired shape. This property of glass will be considered further on, as the different methods of manufacture are described. Molten glass is an amorphous substance, but when allowed to stand undisturbed for hours it will crystallize. This process is called devitrification, and any excess of lime will cause devitrification more rapidly. The preceding table, showing the components of different varieties of glass, was taken from an article on "Glass," by Robert Linton, in *The Mineral Industry*, for the year 1899 (New York, 1900).

**Preparation of the Material.** Sand being the commercial representative of silica, it is evident that the quality of glass depends, apart from the effect of different processes of manufacture, upon the quality of the sand, and the more thoroughly the sand can be cleansed of impurities before it is melted, the better will be the quality of the glass. Hence, for the finer qualities of glass, the sand is often subjected to a preliminary process of purification by washing, burning, and sifting. The sand is *washed* by stirring it thoroughly in large volumes of water and then allowing it to settle; the lighter particles of dirt, chalk, and other extraneous matter will remain in suspension after the heavier sand has settled, and can be drawn off. The sand is *burned* to remove the moisture and organic matter; it is placed in the bed of an oven and played upon directly by the flame. Last of all, it is *sifted* through copper gauze. The chief impurities found in sand are iron, lime, alumina, chalk, and magnesia, besides organic matter and dirt. Of these the iron is the most troublesome, so that it is customary to estimate the value of sand according to the amount of iron which it contains.

The process of mixing the prepared sand with the other ingredients is called "mixing the batch," the batch being the mechanical mixture of the materials whose chemical combination, brought about by heat, produces glass. It is evident that the materials of which glass is to be made must be mixed with the greatest nicety, knowledge, and skill, if a perfect product is to be obtained. Heretofore the proportioning of materials has been done empirically, but in the best modern factories there is more dependence put upon chemical analyses to determine the proper mixture. The accompanying table shows

some of the different kinds of glass are made in America. See GLASS SAND.

**Furnaces and Fuel.** The furnaces used for melting glass are of two general types, pot furnaces and tank furnaces. The traditional furnace, still the type of pot furnace for flint-glass melting, is round, with from 8 to 12 "monkey pots" in a circle around the central fire, at the base of an enormous chimney. The monkey pot is an oval cylinder with a round top, open only on the upper part of one side. Each one is inclosed in an arch of fire brick, with its mouth only visible outside, and when it cracks the heat must be lowered and the arch torn down, while the red-hot crucible is dragged out and another substituted for it. The melting pots play a very important part and demand the most careful preparation. The slightest flaw is discovered by



SECTION OF WINDOW-GLASS TANK FURNACE, BAUDOUX-PAGNOUL TYPE

the intense heat, and the precious contents are emptied into the well below the furnace. The clay is most carefully selected, but, after months of labor in its construction, the monkey pot yields only a few weeks of service before it breaks. For window, plate, and bottle glass manufacture the furnace is rectangular, with doors at each end for the moving of the pots, which, when they are used, are simply great cups with flat bottoms and sides broadening upward to an open top. But the pots are always unreliable and troublesome affairs. When one suddenly cracks, perhaps a few days after its inauguration, everything must be stopped for a day till another is built in and its contents fused; when the glass is all worked, half a

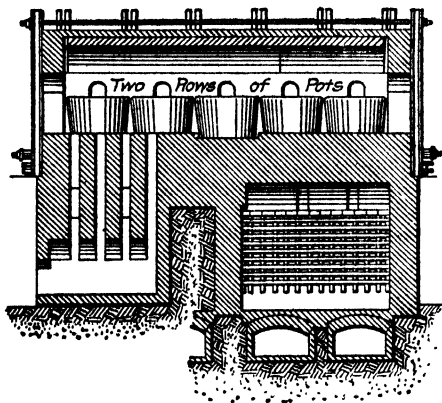
#### RECIPES FOR AMERICAN GLASS

	WINDOW GLASS			PLATE GLASS			GREEN BOTTLES			LEAD FLINT	
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sand	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Salt cake	44.0	40.0	42.0			40.0					
Soda ash		4.0		30.0	36.0		38.0	35.0	38.0		
Limestone	26.0	38.0	40.0	24.0	24.0	38.0	24.0	22.0	34.0		
Carbon	4.0	8.0	6.0	1.0	.75	4.0					
Arsenic					1.0	2.0				.5	.15
Charcoal											
Potash								5.0		36.0	34.0
Red lead										40.0	48.0
Nitre										5.0	6.0
Borax										.3	.06
Antimony											.02

typical mixes for American glass. While it is true that a practical glassmaker might not follow any of these recipes exactly, but would have to modify them to suit the peculiar requirements of his own material and furnaces, yet they will serve to give a general idea of the average composition of the batches from which

day is taken for another batch to be melted; while the molten glass is worked, the furnace must be cooled; moreover, the sulphur and soot from coal fuel are constant annoyances. To escape these difficulties the "tank furnaces," heated by gas, are now used and have revolutionized the whole glass industry.

In 1861 the first regenerative glass furnace was introduced into Germany by its inventor, Siemens, and this type of furnace is in wide use in Europe and America. In these furnaces



REGENERATIVE OPEN-POT FURNACE.

the gas is generally produced from coal outside of the furnace, mixed with the air, on the principle of the Bunsen burner. In the United States natural gas, and later on petroleum, have been largely used as a fuel. Instead of melting pots there is a tank, constructed from pot clay, covering the whole area of the furnace, and divided by floating partitions into compartments. The melting compartment at the rear receives the raw material through the doors. As this melts, it flows into the refining compartment, where a higher temperature purifies it till it flows under the second partition into the gathering compartment, and there a lower temperature thickens it for the blower. A recent improvement dispenses with the floating partitions by the use of floating vessels, which gather the molten glass at the lowest depths in the tank and raise it to the surface to be completely refined in a special compartment, whence, as it sinks in perfect fusion (the best glass being the heaviest), it can only flow into the working-out compartment. The depth of the floaters is usually one-fourth the depth of the tank. These tank furnaces may be worked continuously, with no change in temperature and no discoloration from smoke and on a colossal scale.

Improvements in the methods of glass manufacture have all been in the direction of substituting gaseous for solid fuel. Even in pot furnaces gas is preferred, and for a tank furnace it is indispensable. Natural gas is the ideal fuel, but is very limited in its occurrence, and when it cannot be obtained gas is manufactured from other fuel. Its advantages are its freedom from ashes and other dirt, and the ease with which the flame may be applied and controlled.

A commercial classification of glass and of the principal types of furnaces producing it may be given as follows: 1. *Polished plate* embraces all glass cast upon a smooth table, rolled to the required thickness with a roller, annealed, and then ground and polished. Under this head comes *thin plate*, a recently developed process. 2. *Rough plate* includes all glass cast as above, but not ground and polished. The principal varieties are *ribbed plate*, *colored cathedral*, *rough plate*, *wire glass*, *heavy rough plate* for

skylights. 3. *Window glass* embraces all glass blown in cylinders and afterward cut and flattened out and polished while hot. Chiefly used for pictures and mirrors. 4. *Crown glass* is glass blown in spherical form and flattened to a disk shape by centrifugal motion of blowpipe. A little is now made for decorative purposes. 5. *Green glass*. All the common kinds of glass, and not necessarily green in color. Used in manufacture of bottles, fruit jars, etc. 6. *Lime flint* includes the finer kinds of bottle glass, certain lines of pressed tableware, and many novelties. 7. *Lead flint* embraces all the finest products of glassmaking, such as cut glass, fine tableware, artificial gems, and optical glass.

The principal furnaces are: (1) open-pot furnaces for bottles and window glass; (2) open-pot furnaces for plate glass; (3) covered-pot furnaces for flint glass; (4) day tanks, which are practically open-pot furnaces, gas-fired, and with a single tank or pot; (5) regenerative continuous tank furnaces for window glass; (6) regenerative continuous tank furnaces for bottles; (7) recuperative continuous tank furnaces for bottles.

**Manipulation.** The curious viscosity assumed by molten glass has already been referred to. While in this condition it may be gathered up in a soft mass on the end of a stick, and, if the stick be a tube, the lump may be distended, by blowing through the tube, into a hollow sphere. The form of this sphere or bulb may be modified by manipulating the pipe, and if a second iron be attached by a seal of glass to the other side of the bulb, it may be drawn out into a tube. If the bulb be opened by removing it from the blowing iron, and then, after attaching it at its opposite side to another iron, be trundled rapidly like a mop, the opening will expand, by centrifugal force, into a disk. These are the processes which, infinitely diversified and complicated by the skill of the workmen and the nature of the product, constitute the art of the glass blower. Every melting furnace has several working furnaces called "glory holes," where the glassworker reheats his work. These are small blast furnaces, each affording several openings into the flames.

There are three general methods of shaping glass—by blowing, pressing, and casting.

**Window-Glass** making in recent years has been revolutionized by the use of machinery. Formerly window glass required the most muscular and skillful workmen, but this has been changed somewhat by modern methods. The older method, however, is fundamental and presents many points of interest. Here the "monkey pots" are filled with the mixed "batch," and when this is melted a second charge is shoveled in, followed, as soon as it flows, by a third and a small amount of "cullet" (broken glass), which fills the pots. Sixteen hours are consumed in the entire melting, and the master melter carefully watches his "monkeys," forcing the furnaces to their highest heat. As soon as the signs appear indicating that the molten glass or "metal" is ready to work, the heat is lowered to thicken the glass for the blowers. Each man is trained to one small part of the whole process and does nothing else. The gatherer holds a mask before his face, by a plug grasped between his teeth, to screen him from the glare of the furnace, and starts the "journey" of the glass by dipping the blowpipe into the pot several times, dexterously forming on its end an

oval mass of the white, hot, gummy "metal," which weighs from 20 to 40 pounds, according to the thickness and size of the sheet to be made. Revolving the ball in the glaring pot, he completes its symmetry and consistency and then turns it in an iron mold till it takes a perfect pear shape. This finishes the gatherer's work, and he hands the fiery sphere to the blower, who is the master workman of the establishment. He takes the pipe from the gatherer's hand and blows a huge bubble of air into it, then another and another, swelling the solid sphere into a great decanter, with its thinnest part hardening next the pipe, as one end of the cylinder which is to be evolved from the soft thick mass attached to it. Now he takes his stand on the long narrow platform which leads to his furnace door over a deep pit, swinging the glowing bulb like a giant pendulum into the depths below, persuading it to elongate with frequent puffs at the most effective moments. Now and then, as it cools into hardness, he rests his pipe on a prop and softens the end in the furnace, or he may toss the cylinder above him until it settles into a workable condition. Thus he blows and swings, and, heating from time to time the molten mass, he works it till it grows as long as himself and becomes a round-topped cylinder. When this has cooled considerably, he holds the end in the furnace, blows strongly into it, and, covering the mouthpiece with his thumb, an explosive report is heard. The imprisoned air, heated expansively, has burst an opening through the soft extremity. Revolving the end rapidly in the furnace, the blower enlarges the hole by centrifugal force, till it is as large as the diameter of the cylinder. Then he cools it in a pit to a cherry red, and his part is done. An assistant carries it off and detaches it from the blowpipe by encircling the neck with a thread of hot glass and then touching the line with a cold iron. The cylinder is then cracked lengthwise by a diamond or by passing a red-hot iron inside it. Next the flattener takes it. First he warms the split cylinder, then places it on the stone before him, a fire-clay table, which revolves within an oven. The curved sheet opens in the heat like an uneven sheet of paper, and he smooths it by a wooden block. The stone carries it then to the cooling oven, whence it is lifted on an immense fork into a car at the mouth of the "leer," or annealing tunnel, and there it is tempered for service. To-day these huge cylinders are made by a drawing machine, by means of which cylinders of large size are formed by drawing the material from the bath. There are numerous variations of this process and special machines for which many patents have been secured since the beginning of the present century.

**Crown Glass**, once the favorite for window-panes, has now shrunk into small importance and is made for ornamental work only. Though much more brilliant, the plates are small and of tapering thickness. The same molten material as that used for sheet glass is gathered in a smaller globe on the end of a blowpipe and rolled into a cone on a stone table, or "marver." The workman blows it then into a sphere and flattens the underside of it, keeping in the centre the "bullion point," or thick apex of the original cone. While he rests the pipe on a horizontal support, another workman with a "punty," or solid iron rod, attaches a small cup of warm glass to the bullion point, and the blower de-

taches his pipe by touching the neck of the flattened globe with a cold iron and quickly striking it. The punty man carries it off with a small hole where it left the blowpipe, and, heating it in the furnace and revolving it, the opening enlarges wider and wider until it becomes the "crown," which named it, and at last whirls out into a flat disk, or "table." This is kept incessantly turning till it cools enough to be laid on a support, where it is clipped by shears from the rod and sent to the annealing oven. The diameter of such a plate varies from a few inches, like those made in colored glass for fancy windows, to 6 feet. But the square panes cut from it are always small, as the round lump in the centre, the "bullion point," or "bull's-eye," must be omitted, though these are sometimes used for decorative purposes.

**Plate Glass** has the same composition as sheet and crown glass, but is melted in vast open vessels (sometimes holding  $2\frac{1}{2}$  tons) resting upon frames behind fire-clay doors. After the long fusion is perfect, the door is thrown open, and the tank is seized by an immense fork mounted on a truck, and carried bodily to the casting table, where it is hoisted by a crane and poured over the metal bed, which has a very smooth, highly polished surface. A heavy roller passes over it, spreading the glass out in a uniform thickness determined by the height of the strips on either side of the table. Instantly it is rolled into the annealing oven for a tempering of several days. It comes out in the form of rough plate. To be polished it is fastened by plaster of Paris to a large rotary platform which revolves so that the entire surface is covered at each rotation by the disks of grinding machines which rub it with sand, then with emery, and last with rouge, first on one side, then on the other, till 40 per cent of its thickness is removed, and it remains a shining sheet from  $\frac{1}{4}$  to  $\frac{3}{8}$  of an inch thick. "Rolled plate" is cast upon an engraved table, which gives the impressions of fluted lines or fancy patterns in a translucent body of glass adapted to panels and partitions.

**Green Glass, or Bottle Glass**, is the coarsest form, made from roughest materials, and is the simplest branch of glasswork. From the time of the early Phœnicians until 1880 the process of manufacturing glass articles had been practically the same. The operative would dip the glass out by a rod or a blowpipe or by a ladle. The article, in the case of a bottle, was then blown by hand, the pipe was broken off from the bottle, and the neck was finished by hand. The glass articles in the Museum of Art in New York taken from the Egyptian tombs were all made in this way, and, though a great number of people had tried to introduce machinery, no improvement had been successful up to about 1880. Before the days of bottle machines the bottle blower would gather the molten glass on his blowpipe, in the quantity desired for his bottle, or jar, or demijohn, puff a bubble into it, drop the inflated lump into an iron mold, which was closed together over it by a small boy, and blow the glass into its permanent shape with the lettering or trade-mark which was cut in the mold. The jagged mouth was then rounded in the "glory hole," and the bottle went to the "leer." Bottle molds are made of brass or iron and must be maintained at nearly a red heat while being used. The simplest form is of two sides hinged together at the base, and the famil-

iar ridges running up each side of a glass bottle are formed where the two sides of the mold shut together. Sometimes the mold is in three pieces, one for the body and two for the neck, in which case the ridges are only on the neck; this is usually the case with wine bottles.

Formerly the blowing of bottles was done wholly by the breath; but recently blowing machines have been successfully operated and have revolutionized the industry. The manufacture of glass articles roughly may be divided into two classes—wide-mouth articles such as fruit jars or milk jars, and narrow-mouth bottles such as beer bottles, champagne bottles, or druggist bottles. The first attempt at an automatic bottle machine was made by an Englishman named Ashleigh. Ashleigh invented a machine to make a narrow-mouth bottle, for which he obtained several patents and was all but successful in practice. He, however, failed because he could get only one bottle out of about 50 that was marketable, owing to the imperfection of the necks. Following along the lines of progress towards the realization of a practical machine, the next invention that was of any great importance was made by John I. Arbogast. Arbogast conceived the idea of pressing a blank of molten or plastic glass, forming the neck in the pressing operation, then placing the blank in a secondary mold which had the required shape, and turning on a jet of compressed air which blew the bottle to the proper shape. This was only applicable to wide-mouth ware and of course was only semiautomatic. A man gathered the glass in the same manner as has been done for 3000 years and dropped it into the mold. It was then pressed down and blown as described above. To-day practically every wide-mouth bottle is made in this manner, except those that are made on the automatic machine, which will be described later.

The next important step in the progress of the glass industry was made by Michael J. Owens, financed by the Libby Glass Company, of Toledo, Ohio. The Libby Glass Company spent, it is reported, \$500,000 before they made a bottle commercially. After Owens had made use of the vacuum for forming his blanks, he discovered that the only way to make perfect bottles was always to have a fresh surface of glass that was at a white heat. To accomplish this result it was necessary to have the melting part of the furnace revolving. The glass is melted in the usual way in a Siemen's furnace and then run into a revolving pot, which is about 20 feet in diameter and has a portion about 3 feet wide always projecting out from under the cap or covering of the revolving pot opposite to where the glass enters from the furnace. With this revolving mechanism the result desired was accomplished, and there is always a fresh surface of hot glass into which the gathering mold can be dipped. The capital required to build the automatic machine is very large. Two Owens machines are run in a battery on one furnace, and the outlay for a furnace and two machines has been estimated at not far from \$100,000.

The Owens method consists in forming the blank by having the blank mold suspended over the surface of the glass and lowered until it projects into the glass for about an inch. The vacuum is then turned on, and the hollow receptacle is filled with glass by the aid of the vacuum, and the ring is formed. The arm is

then raised, and a knife cuts off the glass from the glass in the tank, thus forming a perfect blank. The machine, which revolves, is a succession of molds, 12 to 16 being on each machine. After the blank is formed as described above, the machine revolves one round; the two parts of the blank mold are opened, the neck part still being closed. The finishing mold is then closed up on the suspended blank, compressed air is turned on, and the finished bottle is blown, and after the machine revolves to the point of delivery, both the next mold and the finishing mold are opened in one movement, and the finished bottle drops out. It then slides down a chute and is pushed into the leer by an automatic arrangement. The leers are made automatic, so that the only hand operation that is necessary on the machine is the oiling and care of the machine and the sorting and packing of the glass articles. The great advantage of this invention is that either narrow-mouth or wide-mouth bottles can be made, and one bottle is made absolutely the same size as the other, as the gathering device always gathers the same amount of glass, which is absolutely impossible in the hand operation.

The saving on this Owens automatic machine is enormous. In the old method of working three men and three boys work together to make 15 gross of beer bottles or 10 or 12 gross of fruit jars, while the machine will turn out, in the case of the former, 110 gross a day, in the case of the latter about 90 gross a day. It is easy to see that there is a saving of about 50 hands. This means, in dollars and cents, a saving of \$125 to \$150 a day. There were in use in 1914 in the United States 60 or 70 of these machines, and it was probable that within five years there would be very few blown-glass articles made in the United States.

Flint Glass broadly includes all the myriad forms of glass except windowpanes and dark bottles. The lead, which the true flint glass alone contains, gives it a characteristic brilliancy and weight. Flint glass is the choicest material for table and cut ware, for optical glass, and for the best blown and pressed ware that fills the household. An extra proportion of lead makes it "strass," from which artificial gems are made. The "lime flint" has a lighter weight and a lustre approaching "lead flint," but it does not equal its royal superior. From this the ordinary utensils are made.

A flint-glass establishment is the most fascinating of glasshouses, as it generally includes blowing, molding, and pressing. A wineglass is made from a glowing bulb as large as a peach. A breath swells it into a hollow sphere the size of the bowl. The gatherer attaches a small knob of soft glass and draws it out into the stem and on the end of this presses a bell-shaped base, previously hardened, which is flattened out into a stable foundation. Shears cut free the top of the bowl, and the furnace rounds the edge, this operation now being done either by a special blowpipe flame or by an electrically heated wire. In fact, machinery may be employed to cut off, round, and polish the edges automatically. So, from three pieces, the ordinary wineglasses and similar-shaped vessels are made.

The costlier kind of table glass has the stem drawn out of the original sphere, and the base, blown separately like a tiny disk of crown glass, is united by its heat to the upper part. All the best "hollow ware" is blown either in the

air and finished by hand for the higher grades, or in molds, which produce the dimmer surface of common qualities. All transparent druggists' or prescription bottles are of flint glass, but are made like the green-glass bottles. A good workman can blow 4800 small "prescriptions" in a day of 10 hours. The combination of colors in flint-glass work is particularly interesting. From the pots, where several hues of glass are fused adjacently, the blower dips two or three contrasting layers, all appearing one, and works them as a single lump into a globe or shade or vase. These can be cut in cameo style or twisted into ingenious displays of their structure. The fancy vases, globes, pitchers, etc., with high or low relief patterns, are blown in molds and finished by hand. The perplexing skein work of interlaced threads of color in a body of transparent glass is produced by winding threads of colored glass, which are then shaped into any hollow pattern or pressed solid into pretty marbles. Machinery has been used with marked success in the manufacture of tumblers and lamp chimneys, and compressed air employed instead of the breath of the glass blower.

**Cut Glass** is first blown into the general shape intended from the brilliant "crystal" and then is ground into a cluster of glistening facets. Grindstones, continually moistened by streams of wet sand, cut the rough pattern, and emery wheels, and finally putty powder, finish the brilliant angles. The grinding mills also remove the punty marks and defective ridges on wine-glasses, etc. "Ground glass" is made by roughening the surface on these wheels or by sand blast or by etching. The last is done by hydrofluoric acid, often in designs for translucent doors and windows, the unetched part of the glass being protected by a coat of wax. The ornaments on fine drinking glasses and shades are engraved by copper disks.

**Pressed Glass**, the least expensive and therefore the most abundant form of flint glass, is the American contribution to the industry. The pressing machine contains a mold of the inkstand, dish, goblet, vase, or statue to be made, and one man cuts off and drops into it a lump of red-hot glass, while another pulls the lever which shapes the object. By this means unskilled labor can produce perfect results, and the process of manufacture is wonderfully shortened. Pressed glass is often made to imitate Bohemian cut glass, the facets being cast instead of being cut, but the angles are always rounded and the lustre less.

**Beads** are still made almost entirely in Venice, where over 1000 artisans are devoted to this work alone. The glass is drawn out into long tubes which are filled with sand to prevent their collapse when annealed and are then cut off into fragments. Colonies of women and children tread them and tie them in bundles to be exported to the ends of the earth. The "pearl beads" of France, invented by Jaquin in 1656 and made ever since by his heirs, are blown from glass tubes, lined with powdered fish scales, and filled with wax. The scales of 16,000 fish are required to make one pound of essence of pearl. The finest of these beads simulate the irregularities of pearls in form and color and are difficult of detection without special tests.

Imitation gems, long the favorite object of the cleverest artificers, have passed from glass manufacturers into the hands of specialists who work with the electric furnace and modern chemical

methods. Originally the base of many false gems was a heavy uncolored flint glass, containing an abnormal proportion of lead to give it weight and brilliancy. See GEMS, IMITATION.

**Colored Glass** is made ordinarily like any others, by the addition of dyes (generally metal oxides) to the molten charge. The same metal produces several colors at different temperatures. Iron gives all the rainbow hues in the order of their position in the spectrum, but its commonest effects are green and orange. Manganese, so staple a decolorizer as to have earned the name "glassmakers' soap," produces in excess pink or amethyst. The manganese in old window glass frequently is betrayed by the analysis of long sunlight in the purple tints that appear. Too high a temperature turns it brown, then yellow, and finally green. Copper makes the reds of cheap glass, especially the ruby glass of the photographers, and when heated further turns purple, blue, and green. Cobalt gives rich blue or black. Gold, in the form of "purple of Cassius" and in a simple solution, creates the finest rubies, violets, and amber, one part of the precious metal coloring 1000 parts of glass. The exquisite objects of amber glass which shade into red are colored from a gold solution in the crucible, and after being fashioned into the desired shape are held in the "glory hole" a few minutes. The second heat transforms the amber to red, and the unheated portion remains an amber tint. Silver, when used as a surface stain, gives a beautiful yellow, and uranium, green or yellow. Carbon, in powdered coal, is used for cheap black and amber bottles. Opalescent ware, in which modern fancy glass excels, gets its color from cryolite, arsenic, or tin.

Mosaic window glass is cast like rough plate glass from small ladles, and the desired tints are carefully selected, to be patched together in harmonious designs by leaden joints. See WINDOW.

Painted glass is colored by enamels fused to the surface. Stained glass is produced by soluble metal oxides applied with a brush and fastened in the stainer's kiln. "Flash glass," or double glass, is made by coating the embryonic bulb of transparent glass with a dip of colored glass and blowing both as one into a sheet of window glass, a lantern globe, or whatever shape is desired. Opaline glass for art windows is made by pouring colored glass of one or more kinds upon white opaque glass and then pressing the whole with a heavy iron roller. This causes the different glasses to intermingle, affording great varieties of color effect. See STAINED GLASS.

**Optical Glass** is a fine quality of glass specially made for specific purposes and the entire manufacture controlled with scientific precision. For this the scientific world has in large part to thank the labors of Abbé and Schott, of Jena. In optical glass the term "flint" implies a glass containing lead, as the density produced by lead causes high refractive power, while "crown" is a lime silicate glass or so composed as borosilicate glass with low refractive power. The fusion of optical glass, like the whole finishing work, requires special care and patience. The melting pot is lined with a glaze of broken glass, having been previously very slowly heated for four or five days. The batch is put in a little at a time and stirred with a fire-clay roller. The molten mass is kept at an intense heat for six or eight hours or more and stirred, to cause all the bubbles of gas to escape, the process being com-

tinued till there are no more bubbles. If the temperature is too low, bubbles remain in the glass. If too high, the pot is attacked, and the clay flaking into the melt spoils the glass. The pot of glass is now taken from the furnace and put in an annealing oven and slowly cooled for several days, or the furnace is sealed and allowed to cool of its own accord. The glass is then broken up into pieces, the faulty ones rejected, and the perfect ones charged in disk-shaped clay molds, where they are remelted to the form of the mold. These glass disks are now ready for the final annealing, which is performed very slowly and with great care.

**Wire Glass.** Wire glass, a combination of wire and glass, has found wide use not only in large buildings, like railway stations, where a single wide-arched roof must span an enormous area and the lighting must be chiefly in this roof, but also for ordinary windows in exposed locations, as a precaution against fire or other accident. The iron of which the netting is composed has a higher fusing point than the glass in which it is embedded, and when exposed to fire it will retain its shape and hold the glass together even after the latter has become plastic. A wire-glass window, door, or casing for elevator shaft, forms an admirable fire screen and is a great protection; in fact, often being required by insurance or building regulations. It has been estimated that much of the fire damage in the United States is caused by insufficient and improper window protection. This was strikingly demonstrated in the case of the San Francisco earthquake and fire, where one building in the path of the fire was equipped with wire glass throughout, and though the glass in the windows was cracked by the heat, the panes remained intact and did not fall out, and the building survived, standing alone, while for blocks around there was nothing but smoking ruins. Ordinary glass panes in a roof are in danger of breaking and falling, and the object sought by the inventor of wire glass was to secure a material at once lighter and stronger than the ordinary glazed-roof windows. The first practical and commercially successful process was patented by Frank Shuman in 1892, and the following year he was awarded a premium by the Franklin Institute for the invention. In making wire glass a very long cast-iron or steel table is set in the floor and heated by gas flames from beneath. Over this the molten glass is poured from a pot containing a ton or more. The woven wire netting is heated nearly as hot as the molten glass. A vehicle holding four heavy rollers and feeding out the red-hot wire is now rolled over the table on a track, one rail of which is on each edge of the table. The first roller smooths and spreads the glass, the second presses deep into the glass the wire netting which slides down an inclined iron table before the roller, the third and fourth rollers complete the process of smoothing and hardening. The sheet of glass is then rough and translucent. It is then taken and polished so that there is an absolutely smooth surface made, and the result is a beautiful, clear plate glass. It is made not only plain and polished, but also rough and figured with prismatic, ribbed, and fancy designs introduced. A number of patents have been taken out to insert the wire netting between two layers of plate glass, and at the present time a great many thousand feet of wire glass are being turned out every

day. It is really one of the most important inventions in the building of fireproof buildings and in every large conflagration has rendered a good account of itself, so that set in metal sashes or framing it is now considered indispensable in building. In fact, many fire engineers prefer wire-glass windows to metal shutters. Wire glass is also employed in street-railway cars and has reduced the amount of injuries in cases of accidents from flying glass. Wire glass is not readily damaged by vibrations and is hail-proof. Its strength enables it to support great weights of snow and to resist flying particles that would break through ordinary glass.

**Annealing** has been referred to already, but it is such an essential part of the art of glass-making that it requires more detailed explanation. In order that glass shall have strength and durability, it must, after it has been fashioned into shape by some process, be cooled more gradually than is possible in the temperature of the open air. This is necessary in order that the pores, which have been distended by heat, may contract evenly throughout the substance instead of closing more rapidly on the surface than inside. In order to effect this, annealing ovens are used in which the temperature is so regulated that the cooling proceeds with extreme slowness, as many as four weeks being required to bring optical glass to its normal temperature. Two kinds of annealing ovens are in use, the intermittent and the continuous. An intermittent kiln is simply a gas-heated oven with a hearth on which the glass is laid. When the heated kiln is filled with ware, it is sealed up and allowed to cool by drafts, which are so regulated that the temperature can be perfectly controlled at every step of the process. In annealing plate glass there is a separate oven for each sheet. Continuous kilns, or "leers," are displacing the intermittent kilns for many forms of glass. The oven is a long narrow passage with the fire at one end, so that the temperature constantly lowers as the other end is approached. An endless chain, with pans on it for holding the glass, is slowly dragged through the oven, and by the time a pan has traveled from the fire to the cold end of the oven the glass in it is properly annealed.

Several processes for rendering glass still tougher than it is made in the annealing oven have been invented. M. de la Bastie has succeeded in imparting considerable toughness to glass by plunging it, while hot, into a bath of oil or melted fat. This process has proved only partially successful, and is not adapted to windowpanes, because glass treated in this way will not cut with the diamond. Another method is in the manufacture of "Verbundglas," or compound glass, which was originated at the works of Schott and Genossen, at Jena, Germany. The glass is made of two layers which expand at different temperatures, one of them being flashed over the other. This glass is especially adapted for chemical vessels, thermometers, lamp chimneys, or, in fact, for any use in which the exterior and interior surfaces are subjected to widely different temperatures. The Jena special glasses and the French (tonnelot) "verre pur" are now used for high-temperature thermometers and show little or no plasticity even at temperatures of 500° C. (932° F.).

There are many strange uses of glass. Threads may be drawn on a reel from molten glass, making a transparent mineral silk fine enough to



weave into cloth or to fashion into fancy plumage. It has been found possible to weave glass into fabrics, sometimes with a warp of silk, and to shape it into collars, neckties, brushes, lamp wicks, etc. M. Dubus Bonnet, of Lille, France, invented a process of spinning and weaving glass into cloth. The warp is composed of silk, forming the groundwork, on which the pattern in glass appears, as effected by the weft. The requisite flexibility of glass thread for manufacturing purposes is due to its extreme fineness, as not less than from 50 to 60 of the original strands form one thread. This fashion had but a short vogue, and the fine particles likely to be separated from the fibres were likely to have an unwholesome effect on those inhaling them. *Mineral wool* is made from the slag-glass refuse of iron smelting, being blown into fine shreds by a blast, to fill walls and floors with a fireproof and rat-proof padding, and for other unique services, as well as in chemical laboratories. *Réamur's porcelain* is an opaque and porcelain-like glass, which has been "devitrified" by great heat and gradual cooling, becoming marvelously tough. *Soluble glass* is a highly alkaline solution of minerals composing glass, which is applied to textures in theatres and elsewhere to render them fireproof. Fire touching them melts the invisible minerals into a glaze which excludes air and prevents combustion. M. de la Bastie introduced into Europe transmuted glass, which had not been annealed, but which, by retaining some of the internal conditions of strain, was tougher than cast iron. The process, however, did not secure commercial success. *Malleable glass* is one of the legends descending from the ancients which may be some day verified. See ENAMEL.

**Bibliography.** Among the authorities on glass are: for the history of the art, Gaudy, *Romance of Glass Making* (London, 1898); for the scientific side, Powell, Chance, and Harris, *The Principles of Glass Making* (ib., 1883); Hovestadt, *Jena Glass and its Scientific Industrial Appliances* (New York, 1902); and Rosenhain, *Glass Manufacture* (ib., 1912); Austin, report on glass in *Twelfth Census of the United States* (Washington, 1902); and volumes on manufactures in later issues of United States census. Consult also: Dillon, *Glass* (London, 1907); Duthie, *Decorative Glass Processes* (New York, 1908); Bate, *English Table Glass* (ib., 1913); Nelson, *Ancient Painted Glass in Europe* (ib., 1913); Saint and Arnold, *Stained Glass of the Middle Ages in England and France* (London, 1913); Bushnell, *Stained Windows* (New York, 1914).

**GLASS, CARTER** (1858- ). An American legislator, born at Lynchburg, Va. He was educated in public and private schools of his native town, learned the printing trade, and worked eight years in the mechanical department of a printing office. He became proprietor of the *Daily News* and the *Daily Advance*, morning and evening papers of Lynchburg. From 1899 to 1903 he was a member of the Virginia Senate and in 1901 a member of the State Constitutional Convention. Beginning in 1902, he served in the United States House of Representatives. He was sponsor in the House for the banking bill (see BANK, BANKING), known popularly as the Owen-Glass Bill, enacted into law in 1912.

**GLASS, MONTAGUE (MARSDEN)** (1877- ). An American story-writer. He was born at Manchester, England, was educated at the Col-

lege of the City of New York and at New York University, and entered the practice of law. After 1900 he became known as contributor to *Munsey's*, *McClure's*, *Harper's Weekly*, the *Saturday Evening Post*, and other magazines. He is known principally as author of *Potash and Perlmutter* (1910), a collection of unusually diverting stories of the Jewish wholesale clothing trade in New York City. As dramatized, it had a long run (1913-14). Other books by this author are *Abe and Marcruss* (1911); *Elkan Lubliner, American* (1912); *Object: Matrimony* (1912).

**GLASS, SOLUBLE.** See WATER GLASS.

**GLASSBRENNER**, glásbrén'ér, ADOLF (1810-76). A German humorous and satirical writer, born in Berlin. From 1831 to 1833 he was editor of the Berlin periodical *Don Quixote*, which in the latter year was suppressed by the ministry. He first became known through his series, *Berlin wie es ist und—trinkt* (33 parts, 1832-50), which originated the Berlin local type of popular humor, much imitated by others. His best work is the comic epic *Neuer Reineke Fuchs* (1846; often reprinted). From 1858 until his death he edited the *Berliner Montagspost*.

**GLASSCHORD**, glás'kórd'. A musical instrument, with keys like a pianoforte, but with bars of glass instead of strings of wire. It was invented in Paris in 1785 by a German called Beyer. The name "glasschord" was given to the instrument by Franklin. When the glasschord was completed it was exhibited publicly in Paris and performed on by the inventor; but it never was received with favor by the instrument makers, so that no more were ever made. See HARMONICA. Consult K. F. Pohl, *Zur Geschichte der Glasharmonika* (Vienna, 1862).

**GLASS CLOTH.** See GLASS PAPER.

**GLASS CRAB.** A larval form of certain macrurous decapoda (q.v.). They were formerly ranked as a separate group of crustaceans. They are remarkable for the transparency of their bodies, whence their name. They have little resemblance to crabs. The head is represented by a large oval plate, bearing eyes mounted on very long stalks; a second plate, the breadth of which much exceeds its length, represents the thorax and bears the feet, most of which are long, and some of them, as in other crustaceans, bifid, with one branch much longer than the other. The abdomen is small. These creatures have no special organs of respiration, but the blood is aerated through the general surface of the body. They are found in tropical and subtropical seas; and so transparent are they that when floating on the surface of the water they would not be perceived but for the beautiful blue of their eyes.

**GLASSE**, glás, HANNAH. The author of *The Art of Cookery* (1747). "Mrs. Glasse, Cary Street," is mentioned among the subscribers to the first edition, which was published anonymously, and in the fourth edition (1770) is an advertisement of "Hannah Glasse, Habit Maker to H. R. H. the Princess of Wales, in Tavistock Street, Covent Garden." Practically nothing else is known of her. *The Art of Cookery Made Plain and Easy* is ascribed to Dr. John Hill in Boswell's *Johnson*, but this is improbable. Mrs. Glasse wrote *The Compleat Confectioner* (c.1770) and *The Servants' Directory, or House-keeper's Companion* (1770). The famous direction, "First catch your hare," although often referred to *The Art of Cookery*, is not to be



found there. She says, "Take your hare when it is cased."

**GLASS EYE.** The wall-eyed pike (*Stizostedion vitreum*). See PIKE PERCH.

**GLASSITES, glās'īts.** See SANDEMANIANS.

**GLASSON, glā'sôn', ERNEST DESIRÉ** (1839-1907). A French jurist, born at Noyon. He was educated at Strassburg, was admitted to the bar in 1860, and, after teaching a year at Strassburg, went to Nancy in 1865 as a member of the new legal faculty. In 1867 he became an instructor in the University of Paris and in 1899 dean of the faculty of law. He did much to popularize the study of comparative legislation. His works include: *Du consentement des époux au mariage* (1866); *Éléments du droit français dans ses rapports avec le droit naturel et l'économie politique* (2d ed., 1884); *Le mariage civil et le divorce* (1879); *Histoire du droit et des institutions de l'Angleterre* (1881-83), which received a prize from the Institute; *Le code civil et la question ouvrière* (1886); *Histoire du droit et des institutions de la France* (1887-96). Glasson was legal editor of *La Grande Encyclopédie* and was elected to the Académie des Sciences Morales et Politiques in 1882. Consult Girodon's sketch in *La Grande Encyclopédie* (Paris, 1885-1903).

**GLASS PAPER, or CLOTH.** An abrasive surface made by powdering glass more or less finely and sprinkling it over paper or calico still wet with a coat of thin glue; the powdered glass adheres as it dries. Glass paper is very extensively employed as a means for polishing metal and woodwork and is sold in sheets.

**GLASSPORT.** A borough in Allegheny Co., Pa., 10 miles south of Pittsburgh, on the Pittsburgh and Lake Erie Railroad, and on the Monongahela River (Map: Pennsylvania, B 7). The surrounding region abounds in coal, and there are manufactories of axes and tools, steel hoops, foundry products, spikes and rivets, glass, etc. Pop., 1910, 5540.

**GLASS SAND.** A sand used in the manufacture of glass. It is obtained from quartzites and sandstones by crushing them to the desired fineness, or from deposits of sand. If the latter is employed, it is sometimes put through a washing process to remove impurities, such as clay, mica, or iron grains. Silica is the chief constituent of glass sand, and impurities such as iron oxide, alumina, titanium oxide, lime, and magnesia should be present in but small amounts, as shown by the analyses given here-with. Some persons believe the injurious effects of alumina and magnesia are overestimated.

CONSTITUENTS	I	II	III	IV
SiO <sub>2</sub> .....	99.95	97.50	99.46	97.705
Al <sub>2</sub> O <sub>3</sub> .....	.30	1.50	.48	.755
Fe <sub>2</sub> O <sub>3</sub> .....		.50		.15
CaO .....	.13		.06	.955
MgO .....	tr.	.50		.442

I, sand, Ottawa, Ill.; II, crushed sandstone, Massillon, Ohio; III, crushed Cambrian quartzite, Cheshire, Mass.; IV, Tertiary sand, Hanover, N. J.

The grains of glass sand may be either rounded or angular, but approximate uniformity of grain is desirable and should range between 30 and 120 mesh. If larger than 30 mesh, the sand is difficult to fuse; if finer than 120 mesh, it is said to "burn out" in the batch. Following are sieve tests of several:

LOCALITY	Sample	Passes 20 mesh	Passes 40 mesh	Passes 60 mesh	Passes 100 mesh
Ottawa, Ill.	Finest grain	100%	100%	92%	25%
"	Coarsest grain	99%	6%	1%	0%
Gray's Summit, Mo.	Crude	100%	88%	55%	1%
"	Finished	100%	92%	25%	2%

Glass sand is obtained from a number of different geological formations, ranging from Cambrian to Pleistocene. The Pleistocene and most of the Cretaceous and Tertiary deposits are sand, but the Cambrian to Carboniferous ones are sandstone or quartzite and have to be crushed before use. Pennsylvania and Illinois are the most important producing States. The glass sand produced in the United States in 1912 amounted to 1,465,386 short tons, valued at \$1,430,471. Consult: Ries, *Economic Geology* (3d ed., New York, 1910)—contains also many references; Merrill, *Non-Metallic Minerals* (ib., 1910); *United States Geological Survey, Mineral Resources for 1909*—many analyses.

**GLASS SNAIL.** A very small, almost transparent snail of the genus *Vitrina*, species of which are common in the northerly United States. These glassy snails are remarkably hardy in reference to cold and consequently are found higher up on mountains than most snails are able to live.

**GLASS SNAKE.** See BLINDWORM.

**GLASTONBURY, glās'n-bēr-i or glās'tün-bēr-i.** A market town and municipal borough in Somersetshire, England, situated on a peninsula formed by a winding of the river Brue, 25 miles southwest of Bath (Map: England, D 5). It has some manufactures, an export trade, and in the vicinity are chalybeate springs which formerly attracted health seekers. Pop., 1891, 4119; 1901, 4016; 1911, 4250; the area of the municipal borough is 5019 acres. Its chief material interest lies in the ruins of its splendid abbey founded in the twelfth century. Of this magnificent pile, which covered 60 acres, the only remains are parts of the abbey church, with the roofless chapels of St. Joseph and of St. Mary, and the Abbot's Kitchen, a square, massive, and strongly buttressed structure, all especially important as specimens of early and transitional architecture, and the abbey barn and the porter's lodge. A causeway across Sedgemoor and many of the houses of the town are built from the materials of the abbey, which became a common and prolific quarry for the neighborhood. Other buildings and places of interest are the George Inn, a pilgrims' hostelry of the fifteenth century; the two parish churches, the Tribunal, Wearyall Hill, and the Tor, 500 feet high, from which a fine view is obtained. Two miles to the southwest lies Sharpham Park, where Fielding the novelist was born.

Glastonbury has prehistoric remains of a lake village of considerable extent. At Glastonbury is said to have been situated the first English Christian church, a little wattled building erected by Joseph of Arimathea, the leader of the 12 Apostles sent by St. Philip to Christianize Britain. Tradition states that Joseph established himself here, owing to his pilgrim's staff, which he planted on Wearyall Hill while he rested, taking root. From it sprang the celebrated "Glastonbury thorn," the *Crategus pre-*

ooc, which, according to popular superstition, blossomed every Christmas Day. It was fanatically destroyed by a Puritan during the Cromwellian period, but grafts exist which maintain the traditional blossoming. The traditional site of the original tree is marked by a stone, inscribed I. A. A. D. XXXI. Joseph was succeeded, a century later, by two missionaries who established a fraternity of anchorites, which the famous St. Patrick organized under monastic rule three centuries later. Although joined to the land by St. Michael's Tor, the peninsula was first known by the Celtic name *Ynys vitrin* (isle of the glassy water) and later as *Ynys yr Afalon* (isle of Avalon, or of Apples). It is the Avalonian burial place of King Arthur and Queen Guinevere. The modern name is a corruption of Glæstyngabyrig. A legend relates that in the long quest of a lost sow a Glæsting was led to an apple tree by the old church, where, pleased with the place, he and his family settled; hence Glæstyngabyrig (city of the Glæstings).

In the eighth century the Saxon King Ine built and endowed a monastery, which suffered during the Danish invasions, but was restored and added to by another famous prelate, St. Dunstan, a native of Glastonbury and a pupil of the institution, who became abbot in 946. During the tumultuous period of the Norman Conquest, Glastonbury remained unmolested. From 1120 to 1172 the old buildings were replaced by much finer ones, which were scarcely completed when they, with the wicker church, were destroyed by fire on May 25, 1184. Henry II immediately ordered a larger abbey and church of superb proportions and architecture to be built, which were finished about a century after his death. The length of the church was 528 feet. During the foundation excavations the supposed grave of King Arthur was discovered. In 1539, on the refusal of Abbot Whiting to surrender Glastonbury and its treasures, Henry VIII suppressed and dismantled the abbey and hanged the abbot on the Tor. His body was quartered, and his head fixed on the abbey gate. He was canonized by the Roman Catholic church in 1896. The famous old abbey clock is preserved in Wells Cathedral. In 1909 the site of the abbey and the remaining buildings were transferred to the Church of England. Consult: Hearn, *History and Antiquities of Glastonbury* (Oxford, 1722); Wakefield, *The Avalonian Guide* (Glastonbury, 1839); Willis, *Architectural History of Glastonbury Abbey* (London, 1866); Gasquet, *The Last Abbot of Glastonbury* (ib., 1908); Henry VIII and the English Monasteries (ib., 1906); Holmes, *Wells and Glastonbury* (New York, 1909); Greswell, *The Early History of Glastonbury Abbey* (Taunton, England, 1909).

**GLASTONBURY.** A town in Hartford Co., Conn., 7 miles southeast of Hartford, with which it has steamboat connection, on the Connecticut River (Map: Connecticut, E 3). It is an agricultural region, producing tobacco and fruit, and has manufactories of soap, woolen goods, paper, and silverware. Pop., 1900, 4260; 1910, 4796.

**GLASTONBURY THORN.** See GLASTONBURY, ENGLAND.

**GLATIGNY**, glá'té'nyé', ALFRED, or ALBERT (1839-73). A French poet, born at Lillebonne (Seine-Inférieure), son of a carpenter. While still very young, he wrote his first play, and at 17 joined a troupe of strolling actors and wandered with them over northern France and into

Belgium. He wrote constantly, with all the faults and failings of an improvisator. He was one of the "Parnassiens" (q.v.). His works include: *Les vignes folles* (1857); *Les flèches d'or* (1864); *Gilles et pasquins* (1872); *Le testament de l'illustre Briacoeur* (1873). He was made the subject of a tragedy (1906) by Catulle Mendès. Consult Mendès, *Légende du Parnasse Contemporaine* (Brussels, 1884).

**GLATZ**, gläts (Bohemian *Kladsko*). The capital of a circle and a fortified town in the Prussian Province of Silesia, situated on the Neisse, among the Sudetic Mountains, 58 miles southwest of Breslau (Map: Germany, G 3). It is commanded by an old citadel, and the right bank of the stream is protected by a strong fort, the Schläferberg, both fortifications dating from 1745. The old ramparts have been demolished, and fine promenades and streets laid out on their sites. Glatz has an old parish church, with the graves of seven Silesian counts, a new Rathaus, a municipal theatre, and a Gymnasium, originally a Jesuit college founded in 1597. The manufactures consist principally of iron products, machinery, furniture, spirits, cigars, shoes, pottery, brushes, lumber, and bricks. Glatz is believed to have been founded by the Bohemians in the tenth century. Pop., 1900, 14,926; 1910, 17,095.

**GLAUBER**, glou'bër, JAN, called POLYDOR (1646-1726). A Dutch landscape painter and etcher. He was born at Utrecht and was a pupil of Berchem and Vilemberg at Haarlem, then of Picard in Paris (1671), and for two years of A. van der Kabel at Lyons. Having gone to Rome, he was much influenced there by Gaspard Poussin, worked afterward in Padua and Venice, and in 1680 went to Hamburg, residing there and in Copenhagen until 1685, when he came to The Hague and settled in Amsterdam, living in the house of Gerard de Lairese, who often painted the figures in his landscapes. These are kindred in conception and coloring to those of G. Poussin, and are to be found in the Louvre, Munich Pinakothek, and most of the principal galleries of Europe. Of his etchings, the best are a series of 12 plates, two after Poussin, and six others published under the title "La grande Chartreuse."

**GLAUBER**, JOHANN RUDOLF (1604-68). A German chemist and physician, born at Karlstadt in Franconia. No details regarding his life are known except that he resided for a long time at Salzburg, then at Kitzingen, then at Frankfort-on-the-Main, then at Cologne, whence he removed to Amsterdam in 1648. A complete edition of his works, in seven volumes, appeared at Amsterdam in 1661. An English translation by Parke, in one large folio volume, was published in London in 1689. Glauber improved many industrial processes and discovered the medicinal properties of numerous substances. His name at the present day is chiefly known for his discovery of hydrated sodium sulphate, which he termed *sal mirabile* and regarded as a universal medicine and a cure for all diseases. See CHEMISTRY: GLAUBER'S SALT.

**GLAUBER'S SALT.** Sodium sulphate,  $\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$ . It is found native as *mirabilite* or *sal mirabile* at various places in Austria, Italy, and Spain, and in the United States in large quantities at Great Salt Lake, Utah. It is also a constituent of mineral waters and exists in small quantities in the blood and other animal fluids. It was originally prepared by

J. R. Glauber in 1658, by treating sodium chloride (common salt) with sulphuric acid. Anhydrous sodium sulphate ("salt cake") is obtained as an intermediate product in the manufacture of soda ash. Glauber's salt is a white crystalline compound, with a bitter saline taste. When exposed to the air, its crystals effloresce, losing most of their water in crystallization and turning into a white powder. Its chief use is as a purgative in medicine, and as such it is largely used in veterinary practice; but it is also largely employed in the production of certain kinds of glass and in fixing lead mordants in dyeing and printing. See SODA.

**GLAUCHAU**, glou'kou. A manufacturing town in Saxony, Germany, situated on the Mulde, 8 miles north-northeast of Zwickau (Map: Germany, E 3). It contains two old churches, dating from the twelfth and the sixteenth century respectively; two castles of the counts of Schönberg; and a new Rathaus. Among its numerous educational institutions the most prominent is the school of weaving, with a good collection of old textiles; also a technical college. Glauchau is one of the centres of the German textile industry, producing principally woolen and half-woolen goods. It has 24 dye establishments; there are also manufactured machinery, vehicles, paper, timber, and brick. Glauchau is the birthplace of the famous mineralogist Georg Agricola. It is the seat of an American consul. Pop., 1900, 25,677; 1910, 25,155.

**GLAUCOMA** (Lat., from Gk. γλαῦκωμα, opacity of the crystalline lens, from γλαυκός, *glaukos*, bluish green; so called from the appearance of the eye in this disease). A disease of the eye, characterized by increased intraocular tension. In addition to primary and secondary glaucoma, a congenital glaucoma is described. According to the rapidity of onset and the severity of the disease, primary glaucoma is divided into inflammatory or congestive, and noninflammatory or simple. The inflammatory type may be acute or chronic. The cause of glaucoma is unknown. The disease has been observed chiefly in old persons, particularly in women, and usually involves the eyes successively. Jews seem predisposed to it. Heredity, gouty and rheumatic diatheses, cardiac and arterial disease, and chronic constipation seem to exert an influence. Persons with hyperopia (see SIGHT, DEFECTS OF) are often afflicted with glaucoma; those with myopic eyes, very rarely. Various forms of excitement, eye strain, improper use of atropine, and other causes of venous congestion of the eyes are mentioned as exciting factors. The essential feature of the disease is the increase of pressure within the eye, the present view being that there is undue retention of fluids within the eye. Acute inflammatory glaucoma may begin with a prodromal stage, in which sight is somewhat obscured by oedema of the cornea, with some dilatation of the pupil and increased tension in the eyeball. A number of these attacks, each followed by increased presbyopia (see SIGHT, DEFECTS OF), are succeeded by the stage of active glaucoma. This is marked by sudden failure of vision, with great pain in the eye, and headache. There are marked increase of tension, cloudiness and insensibility of the cornea; the pupil is oval, fixedly dilated, and often greenish; the iris is dull and changed in color. The conjunctiva is congested, including the space around the cornea. The interior of the eye is cloudy.

Recovery takes place with practically a persistence of all these appearances in a slight degree, and from time to time other attacks occur, the eye being left in worse condition after each. Finally the stage of absolute glaucoma is reached—blindness, increase of the changes in appearance noted in the early attacks, increased tension, and in some cases pain at intervals. Degeneration of the eyeball may follow. Cases of unusual severity, resulting in blindness within a few hours, are known as *glaucoma fulminans*. Chronic inflammatory glaucoma differs from the acute only in the mildness of its initial symptoms and the slowness of its course, the final result being the same. *Simple glaucoma* is a very slowly progressing type, with no active symptoms of inflammation, simply the increased tension and gradual failure of vision. *Secondary glaucoma* is an increase of tension, with other symptoms of glaucoma, secondary to other disease of the eye or to injury. *Congenital glaucoma* usually affects both eyes, leading to blindness. In the treatment of glaucoma atropine must never be employed. Eserine and pilocarpine, locally, may give some relief. Iridectomy, an excision of part of the iris, is the most effectual treatment. Sclerotomy, an incision through the sclera or white of the eye, is sometimes employed in its place, but this procedure has been superseded by trephining, which operation consists in removing a small section of the eyeball at the junction of the cornea and sclera and excising a portion of the iris. Consult T. Henderson, *Glaucoma* (New York, 1910), and R. H. Elliot, *Trephining in the Treatment of Glaucoma* (ib., 1913).

**GLAUCONITE**, gl'kō-nit. (from Gk. γλαυκός, *glaukos*, bluish green), or GREEN EARTH. An iron potassium hydrous silicate. It is found either amorphous in cavities of rocks or in a loosely granular condition. In color it is of various shades of green and is found in Russia, in Belgium, and in various localities in New Jersey and Mississippi in the United States.

**GLAUCOPHANE**, gl'kō-phān (from Gk. γλαυκός, *glaukos*, bluish green + φαίνειν, *phainein*, to appear). A mineral belonging to the amphibole group and crystallizing in the monoclinic system. It is a silicate of sodium, aluminum, iron, and magnesium. The mineral has a vitreous to pearly lustre and is found in various shades of blue. It is a constituent of various crystalline schists, gneisses, and other rocks. It occurs associated with diallage, epidote, mica, garnet, etc., at various points along the Alps in Switzerland, and in Italy; while in the United States it is found on the coast ranges of California. According to Dana, it has been noted as a secondary product due to the alteration of diallage by a process of "glaucophanization."

**GLAUCUS** (Lat., from Gk. Γλαῦκος, *Glaukos*). A Lycian prince, who, along with Sarpedon, assisted Priam in the Trojan War. He was the son of Hippolochus and grandson of Bellerophon and was mythical progenitor of the kings of Lycia. When Glaucus and Diomedes met in battle, they discovered that their houses were joined in hereditary friendship, whereupon they exchanged weapons, Glaucus giving his golden armor for the bronze of Diomedes (*Iliad*, vi). The incident became proverbial for an unequal exchange. Later writers say that Glaucus was afterward slain by Ajax; but his body was carried back to Lycia, as that of his brother had been.

**GLAUCUS.** An artist of Chios, said to have invented the art of soldering iron. His most famous work was a silver vase resting on an iron base, curiously decorated and wrought in his new technique; the vase was dedicated about 605 B.C. by Alyattes II of Lydia to Apollo at Delphi. Consult the article "Glaucus, 46," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912).

**GLAUCUS.** Son of Minos, King of Crete, and Pasiphaë. On one occasion when a child, while playing at ball or, according to another account, chasing a mouse, he fell into a pot of honey and was smothered. His father, after a long and vain search, consulted the oracle and was told that the person who could suggest the aptest comparison for one of his own cows, which had the power of assuming every day three colors, would restore his son alive. Polyidus, the seer of Argos, who likened the animal to the mulberry and the bramble, was ordered by Minos to find the child and restore it to life. Polyidus found the body of the child, but the latter injunction he was unable to perform, and he was therefore sentenced to be entombed alive with the corpse. Seeing in the tomb a serpent bring back to life its dead companion by laying upon it the leaves of a certain herb, Polyidus conceived the idea of treating the dead boy in the same way. The process proved successful. Then Minos ordered the seer to teach the child the art of prophecy. This also Polyidus did, but immediately deprived him again of all remembrance of his instruction. Consult: Höck, *Kreta* (Göttingen, 1829); Roscher, *Nektar und Ambrosia* (Leipzig, 1883); (Gädechens, in Roscher's *Lexikon*, vol. i (Leipzig, 1884 et seq.).

**GLAUCUS.** The hero of Bulwer's novel *The Last Days of Pompeii*.

**GLAUCUS PONTIUS.** According to the legend, a fisherman of Antheion. Through the influence of a magic herb he was changed into a sea god and gifted with unerring prophecy. He is found especially in connection with Nereus, and his train and was worshiped not only at Antheion but on many islands and coasts, as at Delos, Naxos, Corinth. He was especially honored by sailors and fishermen and is often represented in art as wearing a fish basket on his head. In the legends he appears as prophesying to the Argonauts, or as builder and pilot of the *Argo* (consult Ovid, *Met.*, xiii, 904), and his unrequited loves for Scylla and Ariadne were frequent themes among the later poets (e.g., of a satyric play by Æschylus, q.v.). Consult Gädechens, *Glaukos der Meerott* (Göttingen, 1860), and his article on "Glaukos," in Roscher's *Lexikon*, vol. i (Leipzig, 1884 et seq.).

**GLAUCUS POTNIEUS.** A son of Sisyphus (q.v.) by Merope, and the father of Bellerophon (q.v.). According to the legend he was destroyed by his own mares, the most common form of the story being that he was torn to pieces by them (Vergil, *Georgics*, iii, 267). Accounts differ about the place of his violent death and also concerning the immediate occasion of it. Sometimes it is represented as having happened at Iolcus, at the funeral games of Pelias, but usually the scene is laid at Potnie, near Thebes. He is most frequently represented as having offended Aphrodite by having kept his mares from breeding; but other versions of the myth are that he had fed them on human flesh to make them more spirited, or that they had been

suffered to drink at a sacred well in Bœotia, or that they had eaten the herb hippomanes. He was the subject of a lost tragedy of Æschylus (q.v.). In Corinth this legend is confused with that of Glaucus Pontius (see above), and the same stories are told of both. In fact, it is very probable that the Corinthian Glaucus is only a local variation of the commonly worshiped divinity. Some mythologists (comparing the Greek phrase γλαυκὴ θαλασσά, 'the flashing sea') see in Glaucus Potnieus the quiet gleaming sea, whose calm surface is destroyed by the violent risings of the waves, the wild horses of Glaucus Pontius.

**GLAZE.** See POTTERY.

**GLAZE-BROOK, RICHARD TETLEY** (1854- ). An English physicist. He was born at West Derby, Liverpool, Sept. 18, 1854, and was educated at Liverpool College and Trinity College, Cambridge, where he graduated with honors in 1876 and was made a fellow in the following year and in 1895 senior bursar. In 1880 he was appointed demonstrator in physics at the Cavendish Laboratory and 10 years later was made assistant director. He was also university lecturer in mathematics at Cambridge and in 1898 and 1899 was principal of University College, Liverpool. In the latter year he was made director of the National Physical Laboratory, a position he has since held. In 1906 he was elected president of the Institute of Electrical Engineers. Dr. Glazebrook received the degree of D.Sc. from Victoria College and Heidelberg and was elected a fellow of the Royal Society. In 1910 he was made Companion of the Bath. Among his more important researches are those dealing with the absolute resistance of the British Association unit and the specific resistance of mercury, a dynamical treatment of the theory of double refraction, a verification of Fresnel's theory of double refraction in a biaxial crystal, and other investigations dealing mainly with optics and electricity. He is the author, with W. N. Shaw, of an excellent *Text-Book of Practical Physics* (1884) and of a *Text-Book of Physical Optics* (1882); *Laws and Properties of Matter* (1893); *Clerk-Maxwell and Modern Physics* (1896); *Electricity and Magnetism* (1903); *Heat and Light* (2 vols., 1910); *Heat: An Elementary Textbook* (1911).

**GLAZIER, glä'zhër, WILLARD** (WORCESTER) (1841-1905). An American soldier, author, and explorer. He was born at Fowler, N. Y., was educated at Gouverneur Seminary and at the Albany Normal School. In 1861 he enlisted in the Second New York Cavalry. In 1863 he was taken prisoner by the Confederates in Virginia and confined in Libby Prison, Richmond, and at Columbia, S. C. His escape to the Union lines was the subject of his first book, *Capture, Prison-Pen and Escape* (1865), of which more than 400,000 copies were sold. He also wrote: *Three Years in the Federal Cavalry* (1870); *Heroes of Three Years* (1878); *Peculiarities of American Cities* (1873); *Down the Great River* (1887); *Headwaters of the Mississippi* (1892); *Ocean to Ocean on Horseback* (1896). The belief that he discovered the source of the Mississippi is without foundation; the body of water (above Lake Itaska) which he called the source has been named Lake Glazier. Consult his life by Owens, *Sword and Pen* (Philadelphia, 1880), and Harrower, *Captain Glazier and his Lake* (New York, 1886).

**GLAZUNOV, glä'zōv-nōf'. ALEXANDER** (1865-

). A Russian composer. He was born at St. Petersburg and studied first at the Polytechnic Institute. Conscious of his gift for music, and with the advice of many musical friends and teachers in sympathy with his aims, he determined to devote himself entirely to music. His most important teacher was Rimsky-Korsakoff, who was friend as well as teacher. His first symphony was produced when he was but 16 years of age, and the second three years later, under the auspices of Liszt at Weimar. Paris accorded him a most enthusiastic reception when in 1889 he visited there and conducted in person his second symphony and many minor compositions. He visited London afterward and conducted his fourth symphony at a concert of the London Philharmonic Society. In 1896-97, together with Liadoff and Rimsky-Korsakoff, he conducted the national Russian symphony concerts at St. Petersburg. In 1899 he became professor of instrumentation at the St. Petersburg Conservatory and was its director in 1909-12. He belongs to the school of Tchaikowsky in the national sense and, like him, is occasionally prodigal in brilliant orchestral effects. Not only is he perhaps the most prolific, but also one of the most talented, of modern Russian masters. Together with Rimsky-Korsakoff he completed and orchestrated Borodin's opera *Prince Igor*. His principal works are seven symphonies (in E, F $\sharp$ m, D, E $\flat$ , B $\flat$ , C $\sharp$ m, F); five suites; four concert overtures; two serenades; two symphonic poems; a violin concerto in A $\flat$ ; numerous smaller works for orchestra (rhapsodies, fantasies, dances); four cantatas for soli, chorus, and orchestra; several ballets; and much chamber music of unusual merit. Consult A. W. Osowski, *Alexander Glazunoff: His Life and Works* (St. Petersburg, 1907, in Russian).

**GLEANERS, THE.** See GLANEUSES

**GLEASON, FREDERICK GRANT** (1848-1903). An American composer, born at Middleton, Conn. He was a pupil of Dudley Buck and in 1869 went to Germany, where he studied in the Leipzig Conservatory and later in Berlin and London. In 1875 he returned to the United States, becoming church organist in Hartford and New Britain, Conn., and, in 1877, teacher in the Hershey School of Music, Chicago. Mr. Gleason was elected a fellow of the American College of Musicians, president of the Chicago Musical Society, and president general of the American Patriotic Musical League. He composed two grand operas, *Otho Visconti* and *Montezuma*; a symphonic poem *Edris*; several cantatas; some chamber music; and numerous songs and instrumental pieces.

**GLEBA** (Lat., *clod*). Among the Gasteromycetes (q.v.) the fructification, as, e.g., the puffballs, is differentiated into an outer zone, called the peridium, and an inner mass of tissue, called the gleba. It is the gleba which incloses the spore-bearing cells. The variations in the development of peridium and gleba distinguish the five orders of Gasteromycetes. See BASIDIOMYCETES.

**GLEBE** (Lat. *gleba*, *clod*). The land possessed as part of an ecclesiastical benefice or from which the revenues of the benefice arise. The assignment of glebe lands was formerly held to be of such absolute necessity that without them no church could be regularly consecrated. The fee simple of the glebe is held by the law of England to be in *abeyance*; i.e., it is only "in

the remembrance, expectation, and intendment of the law"; but after induction, the freehold of the glebe is in the parson, and he possesses most of the powers of a proprietor, with the exception of the power of alienation. Previous to the Reformation the clergy possessed certain powers of alienation at common law; and if a bishop, with the assent of his chapter, or an abbot, with the assent of his convent, or the like, alienated glebe lands, the deed would not have been void, because the fee simple was in the holder of the benefice for the time being; but by 1 Eliz., c. 19, and 13 Eliz., c. 10, it was provided that all gifts, grants, feoffments, conveyances, or other estates made of glebe lands should be utterly void and of none effect. Neither could the incumbent exchange the lands or any portion of them without the authority of an act of Parliament. This restriction was done away by 55 Geo. III, c. 147, for enabling spiritual persons to exchange parsonage or glebe houses or glebe lands for others of greater value or more conveniently situated for their residence and occupation. By 5 and 6 Vict., c. 54, it is now provided that the commissioners appointed to carry into effect the commutation of tithes shall have power to ascertain and define the boundaries of the glebe lands of any benefice, and also power, with consent of the ordinary and patron, to exchange the glebe lands for other lands within the same or any adjoining parish, or otherwise conveniently situated.

In Scotland, as in England, a glebe forms, as a general rule, a portion of every ecclesiastical benefice of the Established church and is thus an addition to the stipend and sometimes a very important one. As in England, the alienation of glebe lands by the incumbent of the parish has from a very early period been forbidden. (Stat. 1572, c. 48.) Consult Phillimore, *Ecclesiastical Laws of the Church of England* (2d ed., London, 1895).

**GLEBE LAND.** See CHURCH RATES.

**GLEDE.** A bird. See KITE.

**GLEDITSCH**, glä'dich, JOHANN GOTTLIEB (1714-86). A German botanist and writer on forestry, born and educated at Leipzig. After lecturing on botany and materia medica at Frankfurt on the Oder for four years, he was appointed professor of botany at Berlin and director of the Botanical Garden in that city. It was, however, in his capacity as professor of forestry at the Berlin academy devoted to that science that he exercised that permanent influence which induced Linnæus to name the genus *Gleditsia*, the honey locust, after him. His chief publication is *Systematische Einleitung in die neuere aus ihren eigenthümlichen physikalisch-ökonomischen Gründen hergeleitete Forstwissenschaft* (2 vols., 1774-75).

**GLEDITSIA.** See HONEY LOCUST.

**GLEE** (AS. *gligg*, music, Icel. *glg*, merri-ment). The English name of a vocal composition for three or more voices, without instrumental accompaniment, and in one or more movements. The style of music of the glee is peculiar to England and quite different from the part songs of Germany or the older madrigal (q.v.), being more extended and laying emphasis on variety rather than unity. The first glees were written by Arne and Boyce about the middle of the eighteenth century. The great composer of glees was S. Webbe, who died in London in 1816. This form flourished particularly in the period from 1750 to 1825. In

1787 the "Glee Club" was founded in London, which cultivated glees with great zeal until it was dissolved in 1857.

**GLEET.** See GONORRHEA.

**GLEICHENBERG**, glîk'en-bêrk. A watering place of Styria, Austria, 1020 feet above sea level, in a charming, picturesque valley surrounded on three sides by mountains, about 40 miles southeast of Graz, near the Hungarian frontier (Map: Austria, E 3). It is well known for its nonchalybeate saline alkali springs, which are much frequented by sufferers from pulmonary complaints. Large quantities of the water are exported. There are several beautiful châteaux and many villas of the Austrian nobility in the vicinity. Resident population, about 1500.

**GLEICHEN-RUSSWURM**, glîk'en-rus'vûrm, LUDWIG, BARON VON (1836-1901). A German landscape painter and etcher. He was born at Castle Greifenstein in Bavaria, and studied under Max Schmidt and Hagen at the School of Art in Weimar. Given to realistic treatment from the first, with broad, decided brushwork and excellent handling of light, his style of painting afterward approached closely that of the Impressionists, as may be seen respectively from "An Idyl" (1885), in the National Gallery, Berlin, and an "Evening Landscape" (1892), in the Weimar Museum. Both these galleries have also collections of his water colors. His etchings are among the best produced in Germany during the later nineteenth century. He was a grandson of Schiller. Consult the monograph by Freuzel and Lehr (Vienna, 1902).

**GLEIG**, glêg, GEORGE (1753-1840). A Scottish divine, Bishop of Brechin, and primus of the Episcopal church of Scotland. He was born on a farm at Boghall, Kincardineshire, was educated at King's College, Aberdeen, was ordained in the Scottish Episcopal church in 1773, and took charge of a congregation at Pittenweem, Fifeshire, removing thence to Stirling in 1787. He contributed to the *Monthly Review*, the *Gentleman's Magazine*, and other publications, and wrote for the third edition of the *Encyclopædia Britannica*, of which, after the death of Colin Macfarquhar, proprietor and editor, in 1793, he edited the last six volumes, and in 1801 a supplement. He was twice elected Bishop of Dunkeld, but Bishop Skinner, the primus of the Scottish church, whom Gleig had criticized in the *Gentleman's Magazine*, prevented his taking office. In 1808, having acceded to the tests imposed by Bishop Skinner, he was chosen successor to Bishop Strohan, of Brechin. His efforts towards securing a strict adherence to the English liturgy, with the single exception of the communion, were eminently successful. In 1816, when elected primus of the Church of Scotland, he tried to extend the reforms begun in his own episcopate and to cement the alliance with the English church. He was not altogether successful, for his persistent interference in diocesan elections alienated some of his strongest supporters. He resigned the primacy in 1837. He published several volumes of sermons, *The Life and Writings of William Robertson* (1812), and *Directions for the Study of Theology* (1837); and edited Stackhouse's *History of the Bible* (1817). Consult Walker, *Life of the Right Reverend John Gleig, Bishop of Brechin* (Edinburgh, 1878).

**GLEIG**, GEORGE ROBERT (1796-1888). A Scottish writer, born at Stirling, son of the

preceding. In 1812, while a student at Oxford, he joined a regiment on its way to London and served in the Peninsular campaign. During the American War of 1812-14 he participated in the movement against the city of Washington and was severely wounded in the battle of Bladensburg. In 1821 he published an account of the *Campaigns of the British Army at Washington and New Orleans*. After the war he returned to Oxford, entered holy orders, and was presented to the living of Ivy Church, Kent. In 1825 he published *The Subaltern*, an entertaining and well-written novel founded on his experience in the Peninsular War. In 1834 he became chaplain of Chelsea Hospital and in 1844 chaplain general of the forces. Having devised a scheme for the education of soldiers, in 1846 he was appointed inspector general of military schools. Gleig contributed to *Fraser's*, *Blackwood's*, the *Edinburgh*, and the *Quarterly*; and wrote a great variety of biographical, historical, and religious books. The most interesting is his *Life of the Duke of Wellington* (1862). His *Life of Warren Hastings* (1841) was the text for Macaulay's *Essay on Warren Hastings*.

**GLEIM**, glîm, JOHANN WILHELM LUDWIG (1719-1803). A German poet whom the glories of Frederick II's struggle in the Seven Years' War inspired to write the 16 vigorous and thrilling *Lieder eines preussischen Grenadiers* (1758). He was called "Father Gleim" because he assisted many of the younger poets. Gleim was born at Ermsleben, near Halberstadt, and was the most prominent of the early political song writers of Germany. His other songs, fables, romances, classical and mediæval imitations, are, with few exceptions, as unimportant as his didactic epic *Halladat* in Oriental garb (1774), being at their best feebly pretty and at their worst very dull. He died at Halberstadt. Gleim's *Works* are in seven volumes (1811-13). For his life, consult Körte (Halberstadt, 1811).

**GLEIWITZ**, glî'vîts. A town in the southeastern part of the Prussian Province of Silesia, situated on the Klodnitz and the Klodnitz Canal, 100 miles by rail southeast of Breslau (Map: Germany, H 3). It has an old Catholic church. A Gymnasium, a mechanical school, an ironworking school, and a museum are among its institutions. It has a royal foundry and hearths; manufactures machinery, boilers, wire, agricultural machinery, paper, glass, oil, lumber, chemicals, cabinetwork, and piping. Gleiwitz dates from the twelfth century. Pop., 1900, 52,362; 1910, 66,910, mostly Roman Catholics.

**GLENARVON**. Lady Caroline Lamb's first novel, published anonymously in London in 1816. Its caricature of Byron, with whom the author had had a short love affair and a quarrel, soon made the book famous. It was reprinted in 1865.

**GLENCOE**, glên-kô'. A deep, precipitous valley, in northern Argyllshire, Scotland. It extends southward from Loch Leven, is about 8 miles in length, and is divided into an upper and a lower valley. It is famous for the wildness and sublimity of its scenery and for the massacre of Glencoe. The Highlanders, faithful to the Stuart dynasty, were promised full pardon if on or before Dec. 31, 1691, they submitted to the rule of William III and Mary. The surrender of Mac Ian, chief of the Mac-

donalds of Glencoe, was delayed by bad weather until January 7. The sheriff at Inveraray, yielding to his entreaties, accepted his oath on that day, but at Edinburgh the clerks refused to receive it. With these circumstances unknown to the King, Mac Ian's enemies, headed by Sir John Dalrymple, Master of Stair, obtained a royal warrant for their extirpation. Under the guise of friends, 120 men, mostly Campbells and hereditary foemen, led by Captain Campbell of Glenlyon, accepted the hospitality of the Macdonalds for 12 days, then treacherously attacked them at five o'clock in the morning of Feb. 13, 1692. Thirty-eight persons, including children and women, were slain. About 300 men and women escaped in a violent storm, but many perished from cold and hunger in the snow of the mountain gorges. Consult: Macaulay, *History of England* (3 vols., New York, 1908); Charles Leslie, *The Massacre of Glencoe, Being a Reprint of a Contemporary Account*, ed. by E. Goldsmid (Edinburgh, 1885); George Gilfillan, *The Massacre of Glencoe and the Campbells of Glenlyon* (Stirling, 1913).

**GLENCOE.** A city and the county seat of McLeod Co., Minn., 51 miles west-southwest of Minneapolis, on the Chicago, Milwaukee, and St. Paul Railroad, and on Buffalo Creek (Map: Minnesota, C 6). It is surrounded by a farming and dairying region, and has grain elevators, flour mills, a foundry, machine shops, a creamery, etc. Stevens Seminary is located here. The water works are owned by the city. Pop., 1900, 1780; 1910, 1728.

**GLENCOE, OR THE FALL OF THE McDONALDS.** A drama by Sir Thomas Talfourd, produced in 1840 by Macready.

**GLEN'CORSE, LORD.** See INGLIS, JOHN, LORD GLENCORSE.

**GLEN COVE.** An unincorporated village in Nassau Co., N. Y., 28 miles northeast of Brooklyn, on the Long Island Railroad and on an inlet of Long Island Sound (Map: New York, B 3). It is the seat of a Friends' Academy and has three fine public school buildings and a public library. It has manufactories of leather belting, but is essentially a residential place. It was settled in 1668. Pop., 1914 (local est.), 7500.

**GLENDALE.** A city in Los Angeles Co., Cal., 7 miles north of Los Angeles, on the Pacific Electric and the San Pedro, Los Angeles, and Salt Lake railroads. It contains a branch of the Battle Creek Sanitarium, a Carnegie library, and a fine high-school building. The city is situated in a rich fruit-growing country, producing chiefly oranges and olives. The electric-light plant is owned by the municipality. Pop., 1910, 2746.

**GLENDALE, BATTLE OF.** See FRAZIER'S FARM, BATTLE OF.

**GLEN'DIVE.** A city and the county seat of Dawson Co., Mont., 78 miles by rail northeast of Miles City, on the Yellowstone River, and on the Northern Pacific Railroad (Map: Montana, M 2). The city contains three hospitals and a poor farm. It has railroad repair shops, and carries on an important trade in live stock and wool. Extensive deposits of lignite are found in the adjacent region. The water works and electric-light plant are owned by the city. Pop., 1910, 2428.

**GLENDOWER,** glen-doo' or dou'er, OWEN (†1359-†1416). A Welsh chief, claiming descent from Llewellyn and prominent as an opponent

of the English during the reign of Henry IV. He was the last to claim the title of independent Prince of Wales. At first he was a follower of Henry of Lancaster, who succeeded Richard II in 1399, but local troubles forced him into opposition. The Welsh were strongly attached to Richard II and, moved by rumors that Richard was still alive, rose in revolt against Henry (1400). Glendower led this movement and was at first very successful. The King ordered his subjugation and granted his estates to the Earl of Somerset. Though Glendower's forces were inferior in number to those of his adversaries, he was sometimes victorious, chiefly through surprise, ambushes, and the like. Often, however, he was defeated and forced to retire to the hills. In 1402 he drew Lord Grey into an ambush and took him prisoner. A few weeks later Sir Edmund Mortimer, the uncle of the Earl of March, was captured by Glendower, after a battle won by the latter. Treason seems to have been falsely imputed to Mortimer as the cause of his defeat; but Henry IV's suspicions and Glendower's kindness soon made the treason sufficiently real, for Mortimer married one of Glendower's daughters and conspired with him against the English King. At this time Glendower styled himself openly Prince of Wales. In July, 1404, Glendower entered into a treaty with Charles VI of France against the English. Little came of it, for in the following year Glendower sustained severe reverses. For two or three years more his fortunes were somewhat in the ascendant, and then they sank to the ordinary level of the petty warfare of a barbarous mountain chief. On Feb. 24, 1416, Glendower was still alive, but nothing is known about him after that date. His successes show that he had about the highest talents of his class, and he had their faults also. The popular idea of him is to be found in Shakespeare's *King Henry IV*. From the first he has been a kind of mythical hero, and the lapse of centuries does not clear up the exact facts of his history. He was the last champion of Welsh independence which the English kings had been steadily stamping out for nearly a century and a half. Consult: Pennant, *Tour in Wales* (London, 1778); Pauli's *Geschichte von England* (Hamburg, 1854-58); Wylie, *History of Henry IV*, 1399-1404 (London, 1889-98); Bradley, *Owen Glyndwr: The Last Struggle for Welsh Independence* (New York, 1901).

**GLENELG.** A shallow river, 260 miles long, rising in the southwestern part of Victoria (Map: Victoria, A 5). It crosses the boundary into South Australia and enters Discovery Bay, a bight of the Indian Ocean, between Cape Northumberland on the west and Cape Bridgewater on the east. In the rainy season it is subject to heavy floods.

**GLENELG, LORD.** See GRANT, CHARLES.

**GLENGARRY.** A beautiful valley or glen in West Inverness-shire, Scotland, about 8 miles southwest of Fort Augustus (Map: Scotland, D 3). It takes its name from the Garry River, which takes a winding course through it for some 19 miles. This valley was the home of the Macdonnells from the beginning of the sixteenth century until the death of the last of the acknowledged chief's family in the early part of the nineteenth century. Scott is said to have taken the last chief of this family, Col. Alexander Ranaldson Macdonell, as his model for Fergus MacIvor in *Waverley*. The Glengarry cap was named from this valley.



**GLENN, JOHN MARK** (1858- ). An American sociologist. He was born at Baltimore, Md., and was educated at Washington and Lee University (M.A., 1879), Johns Hopkins University, and the University of Maryland (LL.B., 1882). From 1898 to 1907 he was a member (president, 1904-07) of the supervisors of city charities of Baltimore. In 1907 he became director of the Russell Sage Foundation of \$10,000,000 to be used to improve social and living conditions. He was a vice president of the American Statistical Association in 1909-10.

**GLEN'NON, JOHN JOSEPH** (1862- ). An American Roman Catholic prelate, born at Kinnegad, County Westmeath, Ireland. He studied at St. Mary's College, Mullingar, graduated from All Hallows College, Dublin, in 1883, and was ordained a priest in 1884. He served as an assistant pastor of St. Patrick's Church at Kansas City in 1884-87 and as pastor of the cathedral of that city under Bishop Hogan; was vicar-general of the diocese in 1892-94 and administrator of the diocese in 1894-95; became Coadjutor Bishop of Kansas City and Bishop of Pinara in 1896; and Coadjutor Archbishop of St. Louis in 1903, and later in the same year Archbishop. In 1914 the city of Drogheda, Ireland, presented Archbishop Glennon with the freedom of the city.

**GLEN RIDGE.** A borough in Essex Co., N. J., 4 miles from Newark, on the Delaware, Lackawanna, and Western and the Erie railroads (Map: New York City (Greater New York), A 4). It is a purely residential community and contains the Mountainside Hospital and a public library. The water works are owned by the borough. Pop., 1900, 1960; 1910, 3260.

**GLENROY'.** A narrow, rocky glen of Inverness-shire, Scotland, through which flows the Roy. After a course of about 15 miles this stream joins the Spean at Keppoch. The glen is remarkable for three terraces running round it, everywhere horizontal and parallel to each other, and known as the "parallel roads of Glenroy." The highest is about 1150 feet above sea level. The second is 80 feet lower; the third lies about 855 feet above sea level and may be traced round the mountain of the glen into the valley of the Spean. The subject of much scientific study and discussion, they are now conceded to be ancient shore lines of a glacial lake, which halted for a while at the three levels in the process of the return to a normal drainage.

**GLENS FALLS.** A city in Warren Co., N. Y., 40 miles (direct) north of Troy, on the Hudson River, the Champlain Canal, and on the Delaware and Hudson Railroad (Map: New York, G 4). It derives its name from the falls in the Hudson, which supply exceptional power for manufacturing; and the island below the falls is associated with Cooper's *Last of the Mohicans*. The region abounds in points of interest connected with the French and Indian and the Revolutionary wars. There are large quarries of limestone, extensive lime works, Portland-cement works, a number of saw and planing mills, brickworks, and manufactories of paper, shirts, collars, shirt waists, etc. The city has the Crandall Free Library, St. Mary's and Glens Falls academies, a home for aged women, the Parks and Glens Falls hospitals, Crandall Park, and a great iron bridge over the falls. The city owns and operates its water works. Glens Falls was settled in 1763, incor-

porated as a village in 1837, and reincorporated as a city in 1908. In 1864 it was almost completely destroyed by fire and again in 1884 was visited with a similar disaster, which necessitated the rebuilding of the southern part of the city. Pop., 1900, 12,613; 1910, 15,243; 1914 (U. S. est.), 16,362.

**GLEN'WOOD.** A city and the county seat of Mills Co., Iowa, 20 miles south by east of Council Bluffs, on the Chicago, Burlington, and Quincy Railroad (Map: Iowa, B 3). It is the seat of the State Institution for Feeble-Minded Children and contains a public library and fine city park. The city, besides being the centre of important corn and live-stock interests, is in a highly productive fruit-growing country and has a large canning factory and granite works. The water works are owned by the municipality. Pop., 1900, 3040; 1910, 4052.

**GLENWOOD SPRINGS.** A city and the county seat of Garfield Co., Colo., 126 miles (direct) southwest of Denver, on the Colorado Midland, and the Denver and Rio Grande railroads and on the Grand River (Map: Colorado, B 2). It is in a cattle-raising, coal-mining, fruit-growing, and a general farming region and is widely known as a health resort. Among its attractions are numerous hot springs, vapor caves, an open-air swimming pool which affords bathing in winter and in summer, and superb mountain scenery. Pop., 1900, 1350; 1910, 2019.

**GLEVUM.** See GLOUCESTER, ENGLAND.

**GLEYPE, glâr, CHARLES** (1806-74). A French historical painter. He was born at Chevilly, Canton Vaud, Switzerland, was brought up at Lyons, and studied four years with Hersent in Paris. Later he studied the old masters in Italy and traveled extensively in the Orient, sketching land and people after nature. His first work at the Salon appeared in 1840, but he did not obtain marked success until in 1843 he exhibited "Evening," also called "Lost Illusions," now in the Louvre. Among his other works are the "Departure of the Apostles" (1845), in the church at Montargis; "Pentecost," in Ste. Marguerite, Paris; the "Execution of Major Dave" and the "Romans Passing under the Yoke of the Helvetians," in the Lausanne Museum; "Pentheus Pursued by Menads" and the "Charmer," in the Basel Museum. Gleyre's genius was refined and sensitive, and his works were executed with conscientiousness and sincerity; but they are not exempt from the dryness and coldness of the academic style. He opened an important studio in Paris, and among his pupils were many men afterward well known in the world of art. Gleyre died suddenly, May 5, 1874, while visiting the Alsace-Lorraine Exhibition at the Palais Bourbon. For his biography, consult: Clement (Paris, 1878); Berthoud (Lausanne, 1880); Mantz, in *Gazette des Beaux-Arts* (Paris, 1875); Cook, *Art and Artists of our Time*, vol. i (New York, 1888).

**GLICHEZARE, HEINRICH DER.** See HEINRICH DER GLICHEZARE.

**GLID'DON, GEORGE ROBINS** (1809-57). An English archaeologist, Egyptologist, and ethnologist, born in Devonshire. When very young, he was taken to Egypt by his father, who was a merchant residing at Alexandria and also United States Consul. During Gliddon's long residence in Egypt, in the course of which he served for some time as United States Vice Consul, he devoted much time to the study of Egypt.



tian antiquities. Later he came to America and lectured on this subject in Boston, New York, and Philadelphia. His lectures did much to attract popular interest to Egyptology and its results. At the time of his death in Panama he was agent for the Honduras Inter-oceanic Railway. He wrote: *A Memoir on the Cotton of Egypt* (1841); *An Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt* (1841); *Discourses on Egyptian Archaeology* (1841); *Ancient Egypt* (1850; new ed., 1853); *Types of Mankind*, written in conjunction with Dr. J. C. Nott and containing contributions from Agassiz, Dr. Samuel G. Morton, and others (1854); *Indigenous Races of the Earth*, also written in conjunction with Dr. Nott and containing contributions from Alfred Maury, librarian of the French Institute; Francis Pulszky, the Hungarian ethnologist; and Professor Meigs, of Philadelphia (1857).

**GLIERE**, glé-är', REINHOLD MORITZOVITCH (1875- ). A Russian composer, born at Kieff. He studied at the Conservatory of Moscow under Taneieff and Ippolitoff-Ivanoff from 1894 to 1900. His striking inventive power and conciseness of expression soon gained him general recognition both in Europe and in America. With marked predilection he cultivates the purely instrumental forms. His compositions include two symphonies, in E flat and C minor; three string sextets; and two string quartets.

**GLINKA**, glén'ká, FEODOR NIKOLAEVITCH (1786-1880). A Russian soldier and man of letters. He was born at Smolensk and was educated for the army. In 1803 he became an officer and in 1805 fought at Austerlitz. At the close of the campaign he left the service and devoted himself to study and travel about Russia. Upon the invasion of the French in 1812 he reentered the Russian army and remained in active service until the end of the campaign in 1814. When Count Milarodovitch became military governor of St. Petersburg, Glinka was appointed colonel under his command. In 1826, on account of his alleged connection with a political conspiracy, he was banished to Petrozavodsk. After some time he was pardoned, again took up his residence at St. Petersburg, and became Councilor of State. He wrote: *Letters of a Russian Officer in the Campaigns of 1805-06* (1815-16; 2d ed., 1870); a poetical translation of the Psalms, of the Prophets, and of the Book of Job; *Reminiscences of the Year 1812*; a poem, "Kareliya"; and several other things full of mysticism, which possessed his mind after 1853.

**GLINKA**, MIKHAIL IVANOVITCH (1804-57). A celebrated Russian composer of the early modern school. He was born at Novospaskoi, near Smolensk, of aristocratic parents, and consequently received the education of a young noble of the period. His earlier musical teachers were Böhm (violin), Carl Mayer (theory and piano-forte), and later Field; subsequently he spent four years in Italy, ostensibly for his health, but practically completing his musical education. After studying for a little while with Dehn, of Berlin (1834), he was led to attempt composition, the result being the first Russian national opera, *A Life for the Czar* (1836), which received its first performance at St. Petersburg. While the musical treatment of the opera on the whole is Italian to a degree, it is occasionally very Russian in its coloring, which, together with its purely Russian plot and the employment of Russian folk songs, has earned

for its composer the reputation of being the pioneer of the modern Russian school and the forerunner of the famous national composer Tchaikowsky. His success gained for him the appointment of Imperial chapelmaster and conductor of the opera at St. Petersburg. The second opera, first presented at St. Petersburg in 1842, was arranged from a poem of the Russian poet Pushkin and was entitled *Russian and Ludmilla*. In character it is very similar to the first one and was almost as great a popular success. In 1844 he visited Paris and gave a series of orchestral concerts. From 1845 to 1847 he lived in Spain and wrote two overtures on Spanish national themes, *Jota Aragonesa* and *Noche en Madrid*. His other works include compositions for the pianoforte, on which instrument he was a brilliant performer, symphonies, orchestral suites, and numerous songs and romances, the latter clearly indicating the influence of Field. He died at Berlin, while on a visit to his old teacher, Dehn. Consult: Cui, *La musique en Russie* (Paris, 1880); N. Findeisen, *M. I. Glinka* (St. Petersburg, 1898, in Russian); A. Pongin, *Essai historique sur la musique en Russie* (Paris, 1904).

**GLINKA**, SERGEEVITCH NIKOLAI (1776-1847). A Russian author, brother of Feodor Glinka. He was born in the Government of Smolensk and lived principally at Moscow, where he devoted himself to literary work and founded the anti-French periodical *Russky Vestnik* (the Russian Courier). His contributions to juvenile literature include *Russian History for Young People* (3d ed., 1824) and *Reading for Children* (1821). Glinka was a very prolific author: he is said to have written more than 50 works. During the last 20 years of his life he was a censor at Moscow. Owing chiefly to his exaggerated chauvinism, Glinka is now entirely neglected. His *Notes on 1812*, however, still retains some historical interest.

**GLIOMA**, gli-ó'má (Neo-Lat., from Gk. γλία, glía, glue). A tumor arising from the delicate connective tissue which holds together the nerve substance, either of the brain or of other parts, and which has a gummy or glutinous consistency. Its usual seat is the brain, spinal cord, or orbit. See TUMOR.

**GLIS'AN**, RODNEY (1827-1890). An American physician. He was born at Linganore, Md., and graduated at the University of Maryland in 1840. After practicing a few months in Baltimore, he was appointed an assistant surgeon in the United States army and served in that capacity from 1850 to 1861. In the latter year he entered practice in San Francisco and ultimately settled at Portland, Oreg. His publications include the following: *Journal of Army Life* (1874); *Text-Book of Modern Midwifery* (1881); *Two Years in Europe* (1887).

**GLISSON**, glis'son, FRANCIS (1597-1677). An English physiologist, born at Rampisham, Dorsetshire, and educated at Cambridge and Oxford. He became professor of physics at the former university in 1636 and retained that position until his death. In 1639 he also received an appointment as lecturer on anatomy at the College of Physicians, London, of which he was president from 1667 to 1669. He was one of the founders of the Royal Society. His investigations on the morbid anatomy of rickets, as treated in his famous work entitled *De Rachitide, sive morbo puerili qui vulgo The*

*Rickets dicitur, Tractatus* (1050), is especially notable. His work on the liver and its diseases, entitled *Anatomia Hepatis* (1654), is also important, the term "Glisson's capsule," now a part of medical phraseology, perpetuating the name of its author.

**GLISSON, OLIVER S.** (1809-90). An American naval officer, born in Ohio. He entered the navy as a midshipman in 1826, commanded the schooner *Reefer* during the Mexican War, and accompanied Commodore Perry to Japan in 1853-55. In the Civil War he commanded successively the *Mount Vernon* and the *Mohican*, and in the attacks of December, 1864, and January, 1865, on Fort Fisher (q.v.), commanded the third division of the fleet. He was promoted commodore in July, 1866, and rear admiral in June, 1870, and on Jan. 18, 1871, was retired from the service.

**GLOAG, glög, PATON JAMES** (1823-1906). A Scottish clergyman. He was born at Perth and was educated at the academy in that city and at the universities of Edinburgh and St. Andrews. In 1848 he was appointed minister at Dunning and remained there until 1860, when he accepted a call to the ministry of Blantyre. He was minister of Galashiels from 1871 to 1892, when he removed to Edinburgh. He was moderator of the General Assembly in 1889. Besides several translations from the German of works on the New Testament by Lechler, Huther, Lünemann, and Meyer, he published the following works: *Assurance of Salvation* (1853; 2d ed., 1869); *Ænegetical Studies* (1884); *Introduction to the Johannine Writings* (1891); *Subjects and Modes of Baptism* (1891); *The Life of Saint John* (1892). Consult the biography by his wife (London, 1908).

**GLOBE.** A city and the county seat of Gila Co., Ariz., 82 miles (direct) north of Tucson, on the Arizona Eastern Railroad (Map: Arizona, E 4). Noteworthy features are the Roosevelt Reservoir, costing more than \$8,000,000, and the Old Dominion Library. The mining and smelting of copper is the chief industry, and there are also silver and gold mines. Globe owns its water-works system. It was first settled in 1873. Pop., 1900, 1495; 1910, 7083.

**GLOBE** (from Lat. *globus*, ball). A term used to denote any round or spherical body (see **SPHERE**) and often used to signify the earth. "Globes," or "the globes," generally means a pair of artificial globes used as a part of schoolroom apparatus. These are usually hollow spheres of cardboard, coated with a composition of whiting, glue, and oil, upon which paper bearing certain delineations is laid. Globes are either celestial or terrestrial. On the *celestial* globe the stars are represented in positions corresponding to their actual situation in the sky. If the celestial globe is *oriented* (i.e., set in position) correctly, a line drawn from its centre to any star marked on its surface will, if produced to the sky, pass through the actual star. On the *terrestrial* globe the distribution of land and water and their subdivisions, together with important places, are laid down in positions corresponding to those which they actually occupy on the surface of the earth. Terrestrial globes came into wide use as soon as the idea of the sphericity of the earth became prevalent. They afford a generalized representation of the earth which is very convenient, although the equatorial diameter exceeds the polar by  $\frac{1}{111}$  of its length and

the difference is not appreciable to the eye in the sizes of globes usually constructed. The usual mode of making globes is as follows: A ball of wood or iron is used as a matrix, and a layer of damped paper is carefully and closely placed upon this, without paste, and other layers are successively pasted over the first one. Ordinary cardboard is thus produced, but instead of being flat, as usual, it forms a spherical shell. When sufficiently thick, this is cut into two hemispheres, the section being made in the line of the intended equator. The hemispheres are then taken off the matrix and again glued together on an axis, and the whiting composition laid on, the outside of which is smoothed and finished to shape in a lathe. The workman has to lay on this composition evenly enough to balance the globe, in order that it may rest at whatever point it is turned. The smooth surface is now marked with the lines of latitude and longitude and is covered with the paper on which the required geographical or astronomical delineations are engraved. In order to adapt the plane surface of the paper to the curvature of the sphere, it is printed in pieces, small circles for the Arctic and Antarctic regions, and the rest in lens-shaped gores, usually six in number. Great care is required in laying on these curved pieces, so that their edges shall meet exactly without overlapping. The surface is then colored and strongly varnished, and the globe mounted in its frame and stand. It was formerly impossible to represent the relief of the earth on globes, because elevations on the surface of the earth are insignificant when compared to the terrestrial diameter. In recent years, however, patches of color, technically known as layers, and contour lines have been adopted to show altitudes.

Globes of India rubber and gutta-percha have also been made, others of thin paper, to be inflated and suspended in a schoolroom. Embossed globes show, in exaggerated relief, the elevations and depressions of the earth's surface. Compound globes, including the celestial and terrestrial, have been made with an outer glass sphere for the celestial, and an orrery (q.v.) mechanism to show the varying relative positions of the sun and moon, etc. As schoolroom apparatus, globes are used for illustrating the form and motion of the earth, the position and apparent motion of the fixed stars, and for the mechanical solution of a number of problems in geography and practical astronomy. For this purpose each globe is suspended in a brass ring of somewhat greater diameter, by means of two pins exactly opposite to each other, these pins forming the extremities of the axis round which it revolves, or the north and south poles. This brass circle is then let into a horizontal ring of wood, supported on a stand. The globes in common use in schools are from 1 to 4 feet in diameter. The oldest terrestrial globe of any importance (though probably not the first) is that of Behaim. It was constructed in Nuremberg and bears the date of 1492. One of the earliest globes constructed after the discovery of America is that in the New York Public Library (1506-07). Consult V. Fiorini's "Le sfere cosmografiche e specialmente le sfere terrestri," in *Bollettino della Società Geografica Italiana*, vols. xxx-xxxi (Rome, 1893-94).

**GLOBE, THE.** A famous Elizabethan theatre, where most of the plays of Shakespeare, Jonson, Beaumont, Fletcher, Chapman, Massinger,

and Ford were first produced. It was erected in Bankside, by the Burbage brothers, in 1599, and was built chiefly from the material of their earlier theatre in Shoreditch. Its hexagonal outer wall inclosed a circular pit, flanked by three galleries, the pit being open to the sky, while the galleries were roofed with thatch, which caught fire in 1613, during a representation of *Henry VIII*, and caused the destruction of the building. It was soon rebuilt, but was destroyed in 1644 by the Puritans, and a brewery now occupies its site. Consult C. W. Wallace, *Three London Theatres of Shakespeare's Time* (Lincoln, Neb., 1909).

**GLOBE AMARANTH.** See AMARANTH.

**GLOBE FISH.** A marine fish of the family Tetraodontidae and order Plectognathi (q.v.), remarkable for its power of inflation. These fishes possess a large, ventral, bladder-like expansion of the oesophagus, which may be filled with water or air so suddenly that the body assumes at once a spherical form. The skin is stretched to its utmost extent and becomes firm. The scales are mostly reduced to spines embedded in the skin, and these spines now stand upright and form an important protective covering. This power of swelling suddenly must be regarded as an adaptation for defense, since the distended fish can hardly be grasped with impunity by the mouth of any predacious animal. The fishes of this group are chiefly tropical, and some species are as large as a football, or larger, and used as food. Two or three species occur along the eastern coast of the United States, of which one (*Spheroides turgidus*) is very abundant, especially along the rocky shores of southern New England and Long Island, where it is known as swelldoodle, puffer, egg fish, and bellows fish. It is often caught with a hook, and hundreds, usually small, are taken with every haul of a seine. When lifted from the water, it immediately inflates its body by means of short, jerking inspirations of air, and if dropped on the ground will bound about like a rubber ball; or if thrown in the water will bob about for some time at the surface, with little control over its movements and relieving itself with difficulty of its inflation. It forms a very amusing tenant of a salt-water aquarium. A well-known globe-fish of the Nile is the fahaka (*Tetrodon fahaka*). A large edible West Indian species (*Lagocephalus laevigatus*) is better known as rabbit fish. See Plate of PLECTOGNATH FISHES.

**GLOBEFLOWER** (*Trollius*). A genus of plants of the family Ranunculaceae, with a calyx of yellow sepals and a corolla of small and linear petals. There are several species, natives of the colder parts of the Northern Hemisphere. The common globeflower, the lucken gowan of the Scotch (*Trollius europæus*), a native of Great Britain, is sometimes cultivated in flower gardens. The globelike appearance of the flower suggests the name. The spreading globeflower, *Trollius laxus*, occurs in deep swamps from Connecticut to Michigan and also in the Rocky Mountains.

**GLOBIGERINA**, gló-bij'ér-i-ná (Neo-Lat., from Lat. *globus*, ball + *gerere*, to carry). A genus of multilocular perforate foraminifera, with minute shells of glassy, calcareous texture and globular form. They are exceedingly abundant in many portions of the ocean bottom, where they form the greater proportion of the "globigerina ooze." Specimens referred to the

genus *Globigerina* have been found in the Lower Cambrian rocks of the Province of New Brunswick, Canada. Their next appearance is in Triassic rocks. But they do not attain prominence till Tertiary time, when they became quite as abundant as they are at present. See FORAMINIFERA; OOZE; OCEAN DEPOSITS.

**GLO'BIN.** See GLOBULINS.

**GLO'BROID** (from Lat. *globus*, ball + Gk. *eidōs*, *eidos*, form). A spheroidal mass of a double phosphate of calcium and magnesium found in aleurone grains. It is supposed to be a by-product of the formation of the crystalloid in those bodies. See ALEURONE.

**GLOB'ULINS** (from *globule*, from Lat. *globulus*, dim. of *globus*, ball). Natural proteins, which with albumins constitute the principal nitrogenous component of animal and plant tissues. Globulins of different origin possess some individual differences in physical and chemical properties, but also some points of similarity which permit the grouping of them into one class. The principal points of similarity are the following: they all possess the properties of very weak acids; as such, in a free state, they are insoluble in water. They enter into loose combination with neutral salts, and in that form they are soluble in water. However, the addition to a solution of globulin of an excess of the salt again causes its precipitation. Heating of an aqueous solution of every animal globulin, and some vegetable globulins, causes their coagulation. Globulins differ from albumins, not only by differences in solubility and in precipitability, but also by their chemical composition. On decomposition of globulins among other amino acids was found glycocoll. This amino acid is not obtained on decomposition of albumins.

**Preparation of Globulins.** They are prepared from natural sources by extraction with salt solutions. As a rule, the solution contains also albumins and other proteins. The globulins are obtained from this solution in solid state by means of precipitating agents. These may be either very weak acids or neutral salts. They may also be precipitated by dialysing the solution and completely removing the neutral salts. A process analogous to this consists in diluting a salt solution of globulin with a large volume of water. Some of the principal animal globulins are:

1. *Serum globulin*, which occurs in the blood plasma, serum, lymph, transudates, and exudates, and in the white and red cells.

2. *Fibrinogen* is also found in the blood plasma and plays an important part in the clotting of blood. In this process it is converted by the action of fibrin ferment or thrombin into fibrin.

3. *Myosin* constitutes the principal mass of the soluble proteins of the dead muscle. In the live muscle it is present as myosinogen, which is converted by the action of a specific enzyme, the myosin ferment, into myosin.

4. *Crystallin* is the globulin which is found in the lens of the eye.

5. *Lactoglobulin*, together with casein and lactalbumin, occurs in milk plasma.

The vegetable globulins differ from those of animal origin by their solubilities and by their behavior towards neutral salts. For instance, magnesium sulphate is a general precipitant for animal, but not for plant, globulins. Half saturation with ammonium sulphate precipitates nearly all animal, but does not precipitate

a large number of vegetable, globulins. Further, vegetable globulins differ from animal in the behavior of their aqueous solutions towards heat; whereas the former are only imperfectly coagulated by heat, the latter coagulate completely. A particularly interesting property of the vegetable globulin is its capacity to form crystalline compounds. Finally animal and vegetable globulins differ in the proportion of their individual components. When decomposed by heating with strong mineral acids, the vegetable globulins yield a higher proportion of aspartic and particularly of glutaminic acids.

The following are the principal vegetable globulins:

GLOBULINS:	OBTAINED FROM SEEDS OF:
Legumin.....	<i>Pea, Pisum sativum.</i> Horse bean, <i>Vicia faba.</i> Vetch, <i>Vicia sativa.</i> Lentil, <i>Ervum lens.</i>
Vignin . . . . .	Cow pea, <i>Vigna sinensis.</i>
Glycinin... . .	Soy bean, <i>Glycine hispida.</i>
Phaseolin, crystal- line . . . . .	Kidney bean, <i>Phaseolus vulgaris.</i> Adzuki bean, <i>Phaseolus radatus.</i>
Conglutin . . . .	Lima bean, <i>Phaseolus lunatus.</i> Lupines, <i>Lupinus</i>
Vioclin . . . . .	Horse bean, <i>Vicia faba.</i> <i>Pea, Pisum sativum.</i>
Corylin.....	Lentil, <i>Ervum lens.</i> Hazelnut, <i>Corylus avellana.</i>
Amandin. . . . .	Almond, <i>Prunus amygdalus.</i> Peach, <i>Prunus persica.</i> Plum, <i>Prunus domestica.</i> Apricot, <i>Prunus armeniaca.</i>
Juglansin.....	European walnut, <i>Juglans regia.</i> American black walnut, <i>Juglans nigra.</i> American butternut, <i>Juglans cinerea.</i>
Eroelsin, crystalline	Brazil nut, <i>Bertholletia excelsa.</i>
Edestin . . . . .	Hempseed, <i>Cannabis sativa.</i>
Avenalin . . . . .	Oat, <i>Avena sativa.</i>
Castanin . . . . .	European chestnut, <i>Castanea vulgaris.</i>
Maysin . . . . .	Maise, <i>Zea mays.</i>
Tuberin, found in the tubers of }	Potato, <i>Solanum tuberosum.</i>

**GLOBUS HYSTERICUS** (Lat., hysterical ball), or BALL IN THE THROAT. See HYSTERIA.

**GLOCKENSPIEL**, glöck'en-spēl (Ger., bell play). A musical instrument originally consisting



EARLY FORM OF  
GLOCKENSPIEL.

of bells fastened to an iron rod and rising above one another in the form of a pyramid. The bells were struck by means of a hammer with a metal head. Later the glockenspiel was constructed in the shape of a lyre, within which metal bars, instead of bells, were fastened. The bars yield a fuller tone than the bells. The instrument is now also constructed so that metal bars are arranged within a box. In this form the glockenspiel is used in the modern opera orchestra and has a range from  $b^1$  to  $d^3$ . The music is written an octave lower than its sounds. Wagner employs the glockenspiel in the magic fire scene in *Die Walküre*.

**GLOCKNER**, glöck'nër, or **GROSSGLOCKNER**, grös-glöck'nër. One of the highest peaks of the Austrian Alps, commanding a famous view, situated on the boundary between Tirol, Carinthia,

and Upper Austria (Map: Austria, C 3). Its altitude is 12,344 feet.

**GLOGAU**, glö'gou, or **GROSSGLOGAU**. The capital of a district and a second-class fortress in the Prussian Province of Silesia, situated on the left bank of the Oder, 60 miles

northwest of Breslau (Map: Germany, F 3). The town is fortified on three sides and connected by a wooden bridge with a fortified island in the Oder. The more prominent buildings of Glogau are the old castle, the Gothic cathedral on an island in the Oder, the Rathaus, with a high tower, and the post office. Glogau has a prominent geographical institute, a municipal theatre, two Gymnasias, a war college, and is an infantry, artillery, and cavalry station. Castings, machinery, boilers, sugar, starch, dextrin, furniture, and hats are manufactured. It is an important wool market. The railway shops are extensive, and there is some trade in wine. Pop., 1900, 22,147; 1910, 24,524. Glogau was an important fortified place as early as the beginning of the eleventh century and became in the thirteenth century the capital of the Principality of Glogau. At the end of the fifteenth century the town, together with the principality, fell into the hands of Bohemia. During the Thirty Years' War, Glogau was captured repeatedly by the Swedes and the Imperial troops, and in 1741 it was taken by storm by the Prussians and strongly fortified.

**GLOGAU**, GUSTAV (1844-95). A German philosopher, born at Laukischken, East Prussia, and educated at Berlin. In 1882 he was appointed professor at the Polytechnical Institute at Zürich, in 1883 professor extraordinary at Halle, and in 1884 professor of philosophy at Kiel. In 1895 he entered upon a tour through Greece, where he met his death in an accident. Glogau regards philosophy as a science embodying the results of all achievements and thus represents it as a natural growth, inseparable from evolution in its widest sense. Besides his principal work, *Abriss der philosophischen Grundwissenschaften* (1880-88), he published: *Ziel und Wesen der humanistischen Bildung* (1881); *Grundriss der Psychologie* (1884); *Die Ideale der Socialdemokratie und die Aufgabe des Zeitalters* (1892); *Die Hauptlehren der Logik und Wissenschaftslehre* (1894); and *Das Vorstadium und die Anfänge der Philosophie*, ed. by Siebeck (1896).

**GLOGGNITZ**, glögn'its. A small market town of Lower Austria, situated on the Schwarza, at the northern base of the Semmering Alps, 45 miles south-southwest of Vienna (Map: Austria, D 3). The building of the railway from here to Mürtzzuschlag, a distance of 35 miles, was an extraordinary feat of mountain engineering. The line was constructed in 1848-54 at a cost of about \$10,000,000. Gloggnitz has a picturesque castle situated on a hill. Until 1803 it was a Benedictine abbey, but afterward became a private residence. To the southwest lies the interesting castle of Wartenstein. The town has cotton and woolen mills, cabinet-works, stone quarries, and magnesia factories. In the Schwarza valley near by is the large paper factory of Schlögmühl. Pop. (commune), 5296.

**GLOMERULE**, glöm'ër-ül (from Lat. *glomus*, ball of yarn). A flower cluster (inflorescence) which is merely a cyme (q.v.), in which the flowers are crowded so close together as to form a sort of head, as seen in some species of dogwood. See INFLORESCENCE.

**GLOMMEN**. The largest river of Norway, issuing from Lake Aursundsjø, at the town of Røraas, at an altitude of about 2300 feet (Map: Norway, D 6). It flows in a general southerly direction past the fortress of Kongsvinger, emp-

tying into the Skager Rack at Fredrikstad, after a course of 350 miles. Its most important affluent is the Vorma. The Glommen forms a number of lakes and several waterfalls, which greatly detract from its usefulness as a navigable waterway. Boats ascend to the last waterfall, about 10 miles from the mouth of the river, and above this fall the river is navigable for about 20 miles.

**GLONAIN**, glôn'ô-in. See NITROGLYCERIN.

**GLO'RIA IN EXCELSIS** (Lat., Glory be to God on high). The first words and the title of one of the oldest Christian doxologies, Eastern in origin and in use for more than 1500 years. In the English church and American churches it forms part of the communion office and is a substitute for the Gloria Patri after the Psalter. See DOXOLOGY.

**GLO'RIANA**. The "Faerie Queene" in Spenser's famous poem of that name, for whose honor the various combats against vice are undertaken, and who is Prince Arthur's fated bride. She shadows forth Queen Elizabeth in her capacity of sovereign.

**GLO'RIA PATRI** (Lat., Glory be to the Father). The minor doxology in the Christian Church. It is used after the selections from the Psalter and at the end of the anthems.

**GLORIETTA**, BATTLE OF. One of the most important battles fought in the West during the American Civil War. The Union forces, composed of the First Colorado Volunteers and some New Mexico Regulars, under Colonel Slocum, met the Confederates under Major Pyron at Apache Cañon, near Santa Fe, on March 22, 1862. The battle was indecisive, both sides withdrawing from the field. On March 28, however, the two forces met again at the same place. The Federal command, by previously destroying the ammunition, baggage, and provisions of the Confederates, completely routed them, and they were compelled to fall back on their base at Santa Fe. The North lost 71 killed and wounded and the South 96. In Southern reports this battle is called Glorietta, in Northern reports Apache Cañon. It practically put an end to the only serious attempt the Confederates made to invade the West. Consult *Battles and Leaders of the Civil War*, ed. by Johnson and Buel (New York, 1887-88).

**GLORIOUS VIRGIN**, or SAINT MARY THE GLORIOUS. An order of knighthood, founded early in the thirteenth century, and approved by Pope Urban IV in 1262. This institution was ecclesiastical as well as military, and its objects were the protection of widows and orphans and the furtherance of the peace of Italy by the suppression of the strife between Guelphs and Ghibellines. The badge was a red cross surmounted by two stars, and the costume a white mantle. The members were not obliged to take the vow of celibacy or live in monasteries; consequently they were called *Gaudenti* (or Joyful) and this is the name by which they are best known. The order was suppressed towards the end of the sixteenth century. The Order of St. Mary the Glorious, at Rome, was sanctioned by Paul V in 1618. Its object was to suppress the Barbary corsairs who infested the Mediterranean. To make the order effective, the Pope gave the knights command of his galleys and set apart the town and harbor of Civitavecchia for their use. Consult Ashmole, *History of the Most Noble Order of the Garter* (London, 1715).

**GLORY**, IN METEOROLOGY. See HALO.

**GLOSS** (from Lat. *glossa*, gloss, Gk. γλῶσσα, *glōssa*, tongue). A brief note or explanation written upon the margin or between the lines of a manuscript by some reader. In subsequent copyings such glosses often became incorporated as a part of the text. The object was generally to explain some verbal difficulty. From an early period these difficulties were the object of attention, and the writers who devoted themselves to their elucidation were called *glossatores*, and their works *glossaria*. The principal Greek glossators are Hesychius of Alexandria (fourth century), Photius (q.v.), Zonaras (twelfth century), Suidas (q.v.), and Favorinus, a Benedictine (died 1537). Their works are lexicons of difficult words. Most of the rabbinical writers did the same work for the Hebrew text of the Old Testament. The chief glossators of the Latin Vulgate are the celebrated Walafrid Strabo (q.v.), in the ninth century, author of the *Glossa Ordinaria*, and Anselm of Laon, author of the *Glossa Interlinearis*, who continued Walafrid's work in the twelfth century. Their work was the great storehouse of mediæval exegesis. It was printed with the Latin text in an edition of the Vulgate in 1480. In Roman and canon law the practice of introducing glosses was of early origin and probably was in imitation of the biblical glosses. Among jurists the gloss was not purely verbal, but had to do with the true interpretation of the law, and in some cases it was held to be of equal authority with the text itself. From the position which it occupied in the manuscript, being generally written between the lines of the text, it was called *glossa interlinearis*. The gloss of the Roman law is written in very pure Latin, that of the canon law in the Latinity of the mediæval schools. The first collection of glosses to the canon law was made by Johannes Semea (Teutonicus) in 1212. It accompanied the *Decretum Gratiani* and was printed in connection with it (Lyons, 1584). Other divisions for the *Corpus Juris Canonici* also had glosses, and they are given in the edition mentioned above. The term is also used in textual criticism of the Bible for brief readings suspected to be added to the original text for explanatory purposes, written first on the margin and later incorporated into the text.

**GLOSSARY**. See DICTIONARY.

**GLOSSITIS** (Neo-Lat., from Gk. γλῶσσα, *glōssa*, tongue). A term used in designating inflammatory diseases of the tongue. *Glossitis superficialis simplex* occurs with great frequency in febrile and digestive disorders accompanied by "coated tongue" or "strawberry tongue." Chronic superficial glossitis occurs often in hypochondriacs, especially in women; the tongue burns, is painful, especially during eating or speaking, and is dotted with red spots and white nodules. It may last for years, with intermissions of weeks or months. Treatment with nitrate of silver or lactic acid is palliative. A similar condition (*Leucoplakia buccalis*), also known as psoriasis or ichthyosis of the tongue, or smoker's patches, may result from syphilis, the irritation of roughened teeth, excessive smoking, and indigestion. The disease tends to become malignant. Hairy tongue is a rare glossitis in which, surrounding a smooth, yellow, brown, or black area, the papillæ are smaller and resemble bristles. The treatment consists in scraping and the application of antiseptics.

In "geographical tongue" bright red plaques appear, slightly elevated and circumscribed by a gray marginal zone. The forms of the maps change frequently. The trouble generally disappears without treatment. Acute papular glossitis is extremely rare. In acute diffuse glossitis, or abscess of the tongue, the latter becomes enormously swollen, and the chief dangers of the attack are suffocation from swelling of the parts about the hyoid bone, closure thereby of the glottis (see LARYNX), and general infection. The only effective treatment is to make deep incisions into the inflamed part. With a straight bistoury several incisions are made lengthwise sufficiently deep to evacuate the pus. A good deal of blood will usually follow, but if care has been taken not to injure the lingual artery or its branches (see TONGUE), there is no real danger from this cause. Glossitis is also caused by mercury during mercurial stomatitis, by syphilis, tuberculosis, and actinomycosis.

**GLOS/SOP.** A market town and municipal borough in Derbyshire, England, 13 miles east-southeast of Manchester (Map: England, E 3). The town consists of Old Town (Glossop proper), Howard Town (Glossop Dale), and Mill Town. It is situated on rising ground above the deep Dinting valley, where a 2000-foot railway bridge spans it. It is the chief seat of the cotton manufacture of Derbyshire, and has woolen, cotton, and paper mills, dye works, print fields, and iron foundries. The parish church of All Saints, Victoria Hall with a public library, the grammar school, mechanics' institute, and the town hall and market house are the principal buildings. The town maintains a public park, a hospital, and public baths. Melandra Castle, the site of a Roman camp, is near. Pop. (borough), 1901, 21,526; 1911, 21,688.

**GLOSSOP/TERIS** (Neo-Lat., from Gk. γλῶσσα, *glōssa*, tongue + πτερίς, *ptēris*, fern). A fossil fern of the family Tæniopteridæ, which is an important index fossil of certain Permian-Triassic beds of India, Australia, South Africa, and South America, known as the Gondwana series. This fern has thick leaves of linguæ form, with entire margin, median rib, and anastomosing veins.

**GLOS'TER,** or **GLOUCESTER,** glōs'tēr, EARL OF. The father of Edgar and of the bastard Edmund, in Shakespeare's *King Lear*. He is deceived and betrayed by his illegitimate son, blinded by Cornwall, and guided through the country and saved from springing over Dover Cliff by the heir, whom he had unjustly disowned. The story is taken from Sidney's *Arcadia*.

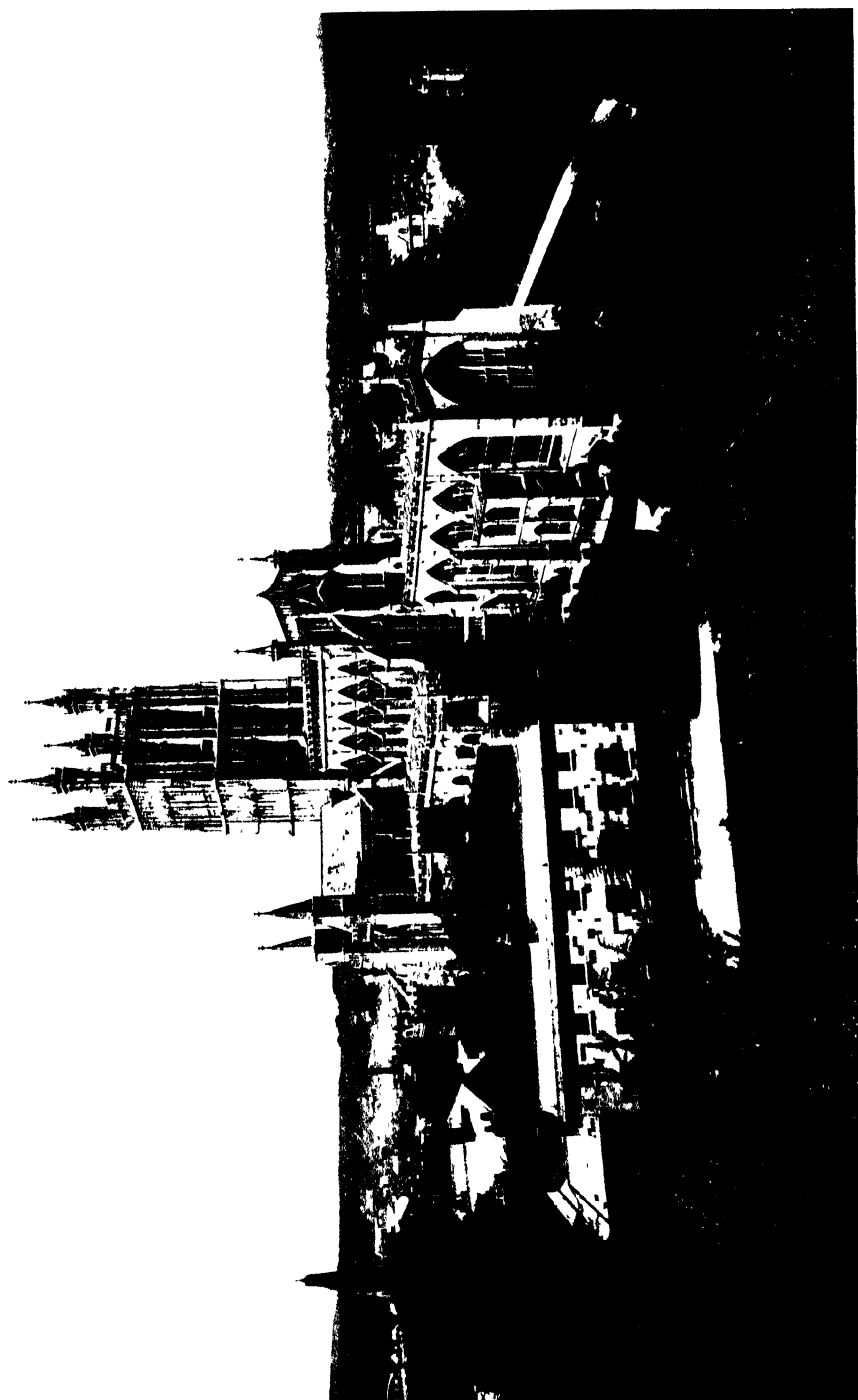
**GLOT/TIS.** See LARYNX.

**GLOUCESTER,** glōs'tēr (AS. *Glēowceaster*, fair city, Lat. *Glevum*, *Claudia*). An inland port, city, and county borough, the county town of Gloucestershire, England, on the left bank of the Severn, 33 miles northeast of Bristol (Map: England, D 5). The city is built on a slight declivity, sloping to the Severn, and is sheltered by the surrounding Cotswolds and Malvern Hills. The modern portion is in the neighborhood of the public park and spa, which contains the chalybeate spring, discovered in 1814. The four main streets, named after their orientation, are wide, and built on the ancient Roman ground plan, meeting at right angles in the centre of the town, where the former town hall, the historic Tolsey, stands at the intersection, on the site of the old Roman Capitol.

Other buildings and objects of interest are the picturesque deanery, formerly the old priory lodge; the New Inn, a pilgrim's hostelry, built in 1540; the episcopal palace; the new guildhall; and many quaintly gabled timbered houses. A cross marks the spot where Bishop Hooper was burned. The principal building in Gloucester is the cathedral, the foundation of which dates from the eleventh century. Formerly a Benedictine abbey, skillful alterations and additions evolved from the Norman body a fine building in various styles of Gothic, which in 1541, after the suppression of monasteries, was converted into a cathedral by Henry VIII. The chief external ornament is the stately central tower, 225 feet high, with its beautiful tracery and pinnacles. It contains the "Great Peter" bell, weighing over three tons. The cathedral was restored between 1873 and 1890 and in 1897. Gloucester has three endowed ancient schools, in addition to several modern schools. It has an important municipal record; it received special charters from several monarchs, and in 1483 was incorporated by Richard III, who made it a county in itself. It is governed by a mayor, 10 aldermen, and 30 councilors. It owns its markets, water works, cemetery, public baths, technical schools, public library, electric-lighting supply, and dust-destroyer works. It has manufactures of railway cars, engines, agricultural implements, and cutlery. There are boat and ship building yards, foundries, flour and saw mills, and chemical, rope, match, marble, and slate works. Bell founding and cloth and pin manufactures were once important industries which no longer exist. A ship canal, 17 miles long, communicating with the estuary of the Severn below Sharpness Point, gives access to the spacious docks. The famous bore or tidal wave of the Severn attains its greatest height just before reaching Gloucester. Considerable commerce is carried on with the Baltic and other foreign ports; corn, timber, wines, and spirits are imported; iron and coal, bricks, pottery, salt, malt, and agricultural products are exported. Gloucester is the seat of an American consul. Pop., 1891, 41,303; 1901, 47,955; 1911, 50,035; area, 2318 acres.

Gloucester was an important Saxon town, styled by Bede "one of the noblest cities in the land." It suffered greatly during the period of the Danish incursions. It was a favorite residence of the Norman kings and was the seat of eight parliaments. Gloucester afforded a refuge and support to Queen Matilda in her contest with Stephen, and Henry III, who "loved Gloucester better than London," was crowned in the abbey. In 1643 Gloucester successfully resisted the royal army under Charles I until relieved by Essex, and at the Restoration its fortifications were dismantled for this "malignity." Robert of Gloucester, the metrical historian, Whitefield, and Wheatstone are among Gloucester's celebrities. Consult: Fosbroke, *Original History of the City of Gloucester* (London, 1819); Masse, *The Cathedral Church of Gloucester* (ib., 1898); *Victoria History of the Counties of England*, vol. ii (ib., 1907).

**GLOUCESTER.** A city in Essex Co., Mass., including the villages of Annisquam, Bay View, East Gloucester, Freshwater Cove, Lanesville, Magnolia, Riverdale, and West Gloucester, 32 miles northeast of Boston, on Massachusetts Bay, on Cape Ann, and on the Boston and Maine Railroad (Map: Massachusetts. F 2). It is a



GLOUCESTER CATHEDRAL





popular resort for summer residents, artists, and tourists, and has the Gilbert Hospital, Home for Aged Fishermen, Huntress Home, Magnolia, public, and Sawyer free libraries, and Stage Fort, Marine, and other parks. The city is the seat of the largest fishery interests in the United States, over 5000 men being engaged in the cod and mackerel fisheries. There is a large, accessible, and safe harbor, and salt, coal, and lumber are extensively imported. Besides the fisheries and the quarrying of granite, the principal industries are shipbuilding, drop forging, brass founding, and the manufacture of fish glue, anchors, machinery, oil clothing, dresses, hardware, hosiery, shoes, nets and twine, sails, and cigars. In 1623 a company from Dorchester, England, settled at Gloucester, but three years later a portion of the settlers removed to Naumkeag (Salem). The permanent settlement dates from about 1633, and a town charter was granted in 1642. It was not until the beginning of the eighteenth century that Gloucester became especially prominent for its fisheries and its shipbuilding industries. Many privateers were sent out during the Revolution and the War of 1812, and the town was unsuccessfully attacked by the English in 1775. Near by is the large sunken rock called Norman's Woe, rendered famous by Longfellow's "The Wreck of the Hesperus." Gloucester was incorporated as a city in 1873 and adopted the commission form of government in 1908. The city owns and operates its water works. Pop., 1900, 26,121; 1910, 24,398. Consult J. J. Babson, *History of Gloucester* (Gloucester, 1860, supp. 1876), and J. R. Pringle, *History of the Town and City of Gloucester, 1623-1902* (ib., n. d.).

**GLOUCESTER, DUKES AND EARLS OF.**—**ROBERT**, first Earl of Gloucester (?-1147), was a natural son of King Henry I and the husband of Mabel of Gloucester. As the champion of the cause of his sister Matilda, he won the famous battle of Lincoln (1141) over Stephen of Blois.—**RICHARD DE CLARE** (1222-62), seventh Earl, was active on the side of the barons under Henry III, quarreled with Simon de Montfort in 1239, but had made up with him in 1261.—**GILBERT**, eighth Earl, surnamed the "Red" (1243-95), was one of the principal leaders of the barons in their conflict with Henry III, but afterward joined the royal cause, and was Regent during the absence of Edward I.—**GILBERT**, ninth Earl (?-1314), a son of the preceding and of the daughter of Edward I, was leader of the advance guard at the battle of Bannockburn, in which he fell. The line soon afterward became extinct, but was renewed in **THOMAS OF WOODSTOCK**, Earl of Buckingham (1355-97), the youngest son of Edward III, who was made Duke of Gloucester by his uncle, Richard II, in 1385, and who later acquired an extraordinary political influence and dominated the affairs of England.—Among the later conspicuous representatives of the title were **HUMPHREY**, Duke of Gloucester, the youngest son of Henry IV (1391-1447), who was Protector during the minority of Henry VI; **RICHARD**, brother of King Edward IV, and King of England as Richard III; **WILLIAM HENRY** (1734-1805), a brother of George III; and **WILLIAM FREDERICK** (1776-1854), a son of the preceding. Consult Vickers, *Humphrey, Duke of Gloucester* (London, 1907).

**GLOUCESTER CITY.** A city in Camden Co., N. J., 1 mile south of Camden, on the Dela-

ware River, opposite Philadelphia, with which it is connected by ferry, and on the Atlantic City and the Pennsylvania railroads (Map: New Jersey, B 4). It has manufactures of incandescent gas burners, Smyrna rugs, woolen yarns, boats, drills, paper, etc. Settled in 1677, Gloucester City was incorporated in 1868 and is governed under the charter of that date, which provides for a mayor, elected every two years, and a unicameral council. The city owns and operates its water works. Pop., 1900, 6840; 1910, 9462; 1914 (U. S. est.), 10,577.

**GLOUCESTERSHIRE**, glōs'tēr-shēr. A southwest county of England, bounded by Worcester and Warwickshire on the north, Oxford on the east, Wiltshire and Somerset on the south, and Monmouth and Hereford on the west (Map: England, D 5). Area, 1259 square miles. Gloucestershire is famous as a dairy county and raises large numbers of cattle; its cider is also noted. The Forest of Dean has some iron deposits. The manufactures are numerous, cloth and textiles being important. The county contains the parliamentary borough of Cheltenham and Gloucester and part of the parliamentary borough of Bristol. Capital, Gloucester. Pop., 1901, 708,439; 1911, 736,125. Consult *Victoria History of the Counties of England*, vol. ii (London, 1907), and P. H. Ditchfield, *Memorials of Old Gloucestershire* (ib., 1911).

**GLOUSTER**, glōs'tēr. A village in Athens Co., Ohio, 15 miles north of Athens, on the Kanawha and Michigan, the Toledo and Ohio Central, and the Zanesville and Western railroads (Map: Ohio, G 6). The chief industries are coal mining and brickmaking. The water works and electric-light plant are owned by the village. Pop., 1900, 2155; 1910, 2527.

**GLOUVET**, glōv'vā', JULES DE. See QUESNAY DE BEAUREPAIRE, JULES.

**GLOVAT'SKI**, ALEXANDER. See GLOWACKI, ALEKSANDER

**GLOVE** (AS. *glōf*; perhaps connected with Goth. *lōfa*, Icel. *lōfi*, Eng. *loof*, palm of the hand). A covering for the hand having a separate sheath for each finger, as distinguished from a mitten, in which there is a separate compartment for the thumb only. The glove is a very ancient article of dress. It has been found in the relics of the cave dwellers, made of leather and sewn with leather thread. Gloves were worn by the ancient Greeks, but chiefly as a protection for the hands in doing heavy work, rather than as an ornamental part of the dress. By the Romans they were worn as ornaments and were considered a sign of rank. While something in the form of a protection for the hands from cold must always have been needed by northern nations, gloves did not become an important article of dress until after the Norman Conquest. It is thought that the custom of carrying a pet falcon upon the wrist led to their general use. During the eighth and ninth centuries they were worn chiefly by persons of noble birth. Hence they were considered a sign of rank and were taken off, as a token of respect, before a superior or in churches. They were worn in the hat as favors and cast down as a challenge. By the sixteenth century gloves were worn by all classes, and then, as now, were made of silk, worsted, and leather. Those worn by the wealthy were most elaborately ornamented with embroidery and lace. As early as 1190 a guild of glove

makers was formed in France, which took upon itself the task of maintaining honest workmanship among glove makers and in introducing constant improvements in methods of manufacture. In Scotland the glovers of Perth were incorporated in 1165. Nearly five centuries later a company of glovers was organized in London, and that city has been an important centre of glove manufacture ever since. At one time glove making was an important industry in Ireland, and the famous "Limerick" glove was widely esteemed for its exquisite texture and workmanship. For many centuries France has excelled in the number and quality of gloves manufactured in some of her cities.

#### Glove Manufacturing in the United States.

The manufacture of leather gloves in the United States is said to date back to the days of Sir William Johnson in New York State. In 1760 he induced several families of glove makers from Scotland to settle on his grants, who brought over with them their glove patterns, and the necessary needles and thread for glove making. Gloves continued to be made in this locality, and gradually the demand for them spread until by 1825 they had found a market in Albany and Boston. These early gloves, as compared with modern productions, were crude and clumsy. They were cut with shears from pasteboard patterns, the cutting being usually done by men and the sewing by women. Later, dies were introduced for cutting and were a great improvement. The invention of the sewing machine in 1852 marked the beginning of a new era in glove manufacture, and soon all hand work was superseded. Steam power for running the sewing machines was introduced in 1875. From the start glove making has been to a large extent a household industry, and it still gives employment to a large number of home workers. The cutting and the stitching on the backs are done at the factories before the gloves are sent out.

**Glove-Making Processes.** The term "kid" is a mere technicality, as the quantity of leather bearing this name yearly consumed is largely in excess of what could be supplied from the skins of all the young goats that are annually slaughtered. Gloves are largely made from lambskin. The finest gloves, however, are made from real kid, derived chiefly from Germany, Austria, Sweden, Brazil, Madagascar, France, and Bavaria. The younger the kid, the thinner, finer, and softer the glove. Lambskin is tougher and harder to work than kidskin, but it is said that none but an expert can tell the difference in their appearance. The so-called dogskin, buckskin, and doeskin gloves are made chiefly from sheepskin; some of the thickest kinds of leather gloves are made from calfskin. *Suede* gloves are those in which the inside of the skin is used as the outside of the glove, the name being derived from the Swedish manner of making up gloves. *Glacé* gloves are made with the outside of the leather retained as the outside of the glove.

The leather in all cases undergoes a much lighter dressing than when used for boots and shoes. The skin having been freed from hair and cleaned, it is prepared for use by one of the three processes of dressing—tanning, tawing, or shamoying—described under LEATHER. For light dress gloves the skins are usually tawed. The leather is next broken or "staked" to render it pliable and even in texture. It is then colored, by painting lightly on the outside, two

or three coats, with a brush, so that the inside will not be affected by the coloring. White gloves are simply undyed gloves. When the dye is thoroughly dried, the superfluous color is removed and the surface rubbed with a size. The gloves are now "doled" on a marble slab, to remove the dirt and irregularities. After the leather has been properly prepared the gloves are cut out by means of dies. The die cuts out all the parts, including the gussets. A single glove consists of from 16 to 19 pieces. The large skins are used for ladies' evening gloves, but one pair of which can be made from a single skin, though ordinarily two pairs of ordinary gloves can be made from one skin. The scraps that are left, unless the skin was tanned, are used for glue. The first and fourth fingers are completed by gussets or strips sewed only on the inner side, but the second and third fingers require gussets on both sides to complete the finger. Besides these, small pieces of a diamond shape are sewed in at the base of the fingers, toward the palm of the hand. The stitching of the parts together, and also the ornamental stitching on the back of the hand, as required by fashion, is done by specially made sewing machines. The putting on of the thumb piece requires special skill and management, and badly made gloves commonly give way at this point.

In the American glove factories there are two classes of cutters, the block and the table cutters, the former of whom are engaged chiefly on the cheaper grades of gloves. The block cutter simply cuts out the glove with a die and hammer, from a skin which is laid on a block of wood. The table cutter first dampens his skin, stretches it to the fullest possible extent, and cuts off the length of a glove. He then stretches it again and cuts it to width, after which fingers are cut to shape with a die. A table-cut glove is more elastic and hence fits better than one cut on the block. The table cutters employed in America are mostly foreigners from the glove-manufacturing centres of Europe, and many of them come from families which for centuries have been engaged in the glove-making industry. To be a good cutter requires not only great experience, but natural dexterity and rare judgment in selecting leather so as to cut out the greatest possible number of gloves and yet avoid flaws.

**Gloves not Made from Leather.** The manufacture of woven and knit gloves is an entirely separate branch of the trade. Sometimes the material is first woven and then cut and made up similarly to the leather gloves, or they may be knit into shape by special knitting machines.

**Statistics.** The centre of the glove industry in the United States is still in Fulton Co., N. Y., in the vicinity where Sir William Johnson planted his first colony of glove makers. Of the 377 glove factories in the United States, in 1909, as reported in the *Thirteenth Census, Manufactures* (1913), 225 were in the State of New York, 156 being in Fulton County, which supplied 54.7 per cent of the total product. Its two principal cities, Gloversville and Johnstown, reported 87 and 54 establishments respectively. The remaining establishments are scattered over the entire country. These 377 establishments represented a combined capital of \$16,908,671, and they turn out an annual product valued at \$23,630,398. This business has shown a steady growth since 1850, when the first census report

of the industry was published. At that time there were already 110 glove factories in the country, with a capital of \$181,200 and an annual product of \$708,184. Of the 3,368,655 dozen pairs manufactured in 1909, all but 782,678 dozen pairs were men's gloves, as the finer grades of women's gloves are still chiefly produced in Europe. In 1913 the imports of gloves into the United States were valued at \$7,691,927.

Consult: Beck, *Gloves: Their Annals and Associations* (London, 1883); Frothingham, *History of Fulton County, N. Y.* (Syracuse, 1892); Côte, *L'Industrie gantière à Grenoble* (Paris, 1903); Pfäfer, *Die Lederhandschuhindustrie Deutschlands* (Heidelberg, 1908); Redmond, *The Leather Glove Industry in the United States* (New York, 1913); "Leather Glove and Mitten Industry," vol. x, *Manufactures: Thirteenth United States Census* (Washington, 1913).

**GLOVE, THE.** A story originally told (about 1550) by Pierre Ronsard, and later variously adapted by Schiller, Leigh Hunt, and Browning. It tells of a lady who tosses her glove into a lion's den and commands her lover to fetch it back. He springs down and, returning unharmed, hurls it in her face in scorn at her capricious cruelty.

**GLOVER, JOHN** (1732-97). An American soldier, prominent in the Revolutionary War, born in Salem, Mass. He removed to Marblehead when very young, was a shoemaker for a time, and then engaged in the fishing business. In February, 1773, he was chosen colonel of a militia regiment which upon the outbreak of the Revolution became a part of the continental army, as the Fourteenth Regiment, better known as the "Marine Regiment." On Oct. 4, 1775, he was placed in charge, with Stephen Moylan, of the equipment and manning of armed vessels and cruisers designed for service against the British, and until July, 1776, was stationed at Beverly, Mass. He then was ordered to New York, and on the night of August 28-29, after the battle of Long Island, conducted the transfer of the American army from Long Island to New York. He was placed in command of General Clinton's brigade on September 4, took part in the battle of White Plains, and on December 25 manned the boats in which Washington and his army effected the passage of the Delaware before the attack upon Trenton. On Feb. 21, 1777, he was appointed brigadier general by the Continental Congress and afterward took an active part in the campaign against Burgoyne; was placed in charge of the British prisoners on their march from Saratoga to Cambridge; took part in General Sullivan's Rhode Island expedition in July and August, 1778; was a member of the court which tried Major André and was officer of the day when André was executed; and in July, 1782, was retired on half pay. He returned to Marblehead and seems for a time to have worked as a cobbler again. In 1788 he was a member of the Massachusetts Convention which ratified the Federal Constitution. His orderly books and a letter book containing his Revolutionary correspondence are in the possession of the Essex Institute at Salem, Mass. Consult Upham, *A Memoir of General John Glover of Marblehead* (Salem, 1863), and Sanborn, *Gen. Glover and his Marblehead Regiment* (Marblehead, 1903).

**GLOVER, JOHN** (1767-1849). An English landscape painter, born in Leicestershire. He was self-taught in art, having been master of

the Appleby Free School from 1786 to 1794. He went to London in 1805 and joined the Water-Color Society, of which he became president in 1815. He received a gold medal at the Paris Exhibition in 1814, and in 1823 he took a prominent part in the foundation of the Society of British Artists. He went to Australia in 1831 and sent to England his sketches of native scenery, until his death in Tasmania. Glover was one of the earliest founders of the modern landscape school and of the English water-color school. He was an artist of some skill and originality, especially skillful in aerial perspective, but his work became mannered. He also painted in oils, but not with equal success. Among his water colors are views of "Tivoli," "Windsor Castle," and a "River Scene," in the South Kensington Museum. One of his best oil paintings is a "Landscape with Cattle," in the British Museum.

**GLOVER, MRS. JULIA BETTERTON** (1779-1850). An English actress, born at Newry. The daughter of an actor, she began to play juvenile parts about 1789. In 1795 she made her formal début as Marianne, in Reynolds's *Dramatist*. Her repertoire included Lydia Languish, Widow Green in *The Love Chase*, and the Queen in *Richard III*. Her last appearance on the stage was as Mrs. Malaprop, at Drury Lane only a few days before her death, July 16, 1850. Remarkable for her memory, she was during her middle life considered the best comic actress of the time and in later years was styled the "Mother of the Stage." Consult the memoir by Mrs. Wilson in *Our Actresses*, vol. ii (London, 1844), and Cook, *Hours with the Players* (ib., 1881).

**GLOVER, RICHARD** (1712-85). An English poet. He was the son of a London merchant, and after attending school at Chesham, in Surrey, he entered his father's business. In 1762-68 he sat in Parliament for Weymouth. Though he never attended either university, he acquired, it is said, a good knowledge of Greek. Be that as it may, most of his poems are founded on Greek subjects. In 1737 appeared his *Leonidas*, an epic in blank verse running through nine books, subsequently (1770) extended to 12 books. Once popular, the poem is no longer read. Its sequel, the *Athenaid* (30 books, 1787), it is hard to believe any one ever read. He wrote several heavy tragedies: *Boadicea* (1753), *Medea* (1761), and *Jason* (1799). His fame now rests upon the spirited "Ballad of Admiral Hosier's Ghost," founded on Hosier's disastrous expedition to Porto Bello (1726). For his poems consult Chalmers, *Works of the English Poets*, vol. xvii (London, 1810).

**GLOVERSVILLE.** A city in Fulton Co., N. Y., 54 miles northwest of Albany, on the Fonda, Johnstown, and Gloversville Railroad, and on the Erie Canal (Map: New York, F 4). It has a Carnegie library, Federal building, and the Nathan Littauer Hospital. Gloversville is the principal seat of the manufacture of gloves in the United States, its factories with those of the neighboring city of Johnstown controlling a large proportion of the entire production of the country. Besides gloves and mittens, there are extensive manufactures of glove and shoe leather, pocketbooks, and leather novelties. Settled during or just before the Revolution, Gloversville was known as Stump City from 1816 to 1832, when it received its present name. It was incorporated as a village in 1851 and

was chartered as a city in 1890. The government, under the revised charter of 1899, is administered by a mayor, elected biennially, and a council which confirms the executive's appointments to the Board of Health and elects all other officers, except standing committees, boards of civil service and plumbing, which are appointed by the mayor. The boards of education and water commissioners are chosen by the people. The city owns and operates its water works and sewage system. Pop., 1900, 18,349; 1910, 20,642; 1914 (U. S. est.), 21,618.

**GLOVE SPONGE**, or **FINGER SPONGE** (so called from the branching shape). An inferior sort of commercial sponge (*Spongia officinalis*) which takes a bushy form, sometimes 2 feet high. It grows on hard bottoms all along the coast of Florida and Bermuda and is regarded as the poorest kind gathered, although closely related to the finest sort of sponge. See **SPONGE**.

**GLOWACKI**, gló-wits'ké, **ALEKSANDER** (1847-1912). A famous Polish writer, best known by his pseudonym "Boleslav Prus," under which he contributed popular feuilletons to the *Warsaw Courier* and the *Illustrated Weekly*. Collections of his works appeared under the titles *Tales* (1881), *Sketches and Portraits* (1885-86), *Early Tales* (1890), and in a complete edition in 1897. In his tales the humorous and lifelike portraits of children, peasants, and animals are peculiarly excellent. The best-known series of tales is *Placówka* (The Sentry), which deals with the national and economic conflict between the enterprising German colonists and the stubborn Polish peasant Slimak (Snail). *The Doll* (1891) is perhaps the most important of his novels, while *The Emancipated Women* is somewhat marred by mysticism. Among his last works was a novel entitled *The Children* (1909). His *Pharaoh* was translated into English as *The Pharaoh and the Priest* (Boston, 1902). His humor conceals a deep sympathy for the unfortunate, to which is added a masterful power of character analysis. Consult Konstanty Wojciechowski, *Boleslaw Prus* (Cracow, 1913).

**GLOWWORM**. See **FIREFLY**.

**GLUCASE** (from Gk. γλυκύς, *glykys*, sweet). An enzyme also known as maltase, found in various species of yeasts, in some molds, and probably also in the seeds of germinating barley and other cereals. It is also found in various parts of animal bodies. The glucase prepared from cereals differs somewhat in its action from that obtained from fungi; the latter acts best at a temperature of 40° C., and the former is most active at 57-60° C. Glucase acts upon maltose, hydrolyzing it into two molecules of glucose. It has also been found to decompose certain glucosides. See **DIGESTION IN PLANTS**.

**GLUCIUM** (Neo-Lat., from Gk. γλυκύς, *glykys*, sweet), or **BERYLLIUM**. A metallic chemical element discovered by Wöhler in 1828. It is not found native, but occurs as a constituent of various minerals, such as beryl, chrysoberyl, and phenacite. Its existence as an oxide was recognized in beryl in 1798 by Vauquelin, but it was not until Wöhler obtained the impure metal by the action of potassium on fused glucinum chloride that the element itself may be said to have been isolated.

Glucinum (symbol, Gl or Be; atomic weight, 9.1) is a steel-colored, malleable metal that has a specific gravity of 1.93, and its melting point is about 1400° C. (about 2550° F.). It is

divalent and combines with oxygen, forming *glucinum oxide*, or *glucina*, GlO, a white infusible powder with a sweetish taste. However, on the basis of the composition of its organic compounds, Tanatar considers glucinum as a quadrivalent element. With copper and certain other metals glucinum forms alloys that have valuable properties; thus, a small percentage of glucinum renders copper sonorous; an alloy of 95 per cent copper and 5 per cent glucinum is malleable, takes a polish, and is not affected by the air.

**GLUCK**, glük, **ALMA** (1886- ). An American dramatic soprano, born at Bucharest, May 11, 1886. Her parents brought her as a child of five to New York. A gentleman who heard her sing was so much struck with the quality of her voice that he advised her to have it cultivated. Without any thought of a professional career she studied with Buzzi-Peccia in New York from 1906 to 1909. In the latter year her teacher induced her to sing for Mr. Gatti-Casazza, the director of the Metropolitan Opera House, who immediately offered her an engagement. She accepted, and made her début as Sophie in Massenet's *Werther* in November, 1909. During that first season she sang 11 different rôles and instantly became a prime favorite with the public. At the same time she also appeared frequently in recitals with such success that she practically withdrew from the stage. In 1912 she went to Berlin and studied for one year under Madame Sembrich (q.v.). In 1914 she married the violinist Efrem Zimbalist (q.v.).

**GLÜCK**, glük, **CHRISTIAN FRIEDRICH VON** (1755-1831). A German jurist, born and educated at Halle. In 1784 he became professor of law in the University of Erlangen, Bavaria. His principal works are *Ausführliche Erläuterung der Pandekten* (34 vols., 1790-1830; continued by other scholars, 1832-93), which was begun to supplement Hellfeld's *Elementa juris civilis* (1728), and *Handbuch zum systematischen Studium des neuesten römischen Privatrechts* (1812).

**GLUCK**, **CHRISTOPH WILLIBALD** (1714-87). A famous German composer and operatic reformer. He was born July 2, 1714, at Weidenwang, in the Upper Palatinate, where his father was forester to Prince Eugene of Savoy, and later to Prince Lobkowitz at Eisenberg. From 1726 to 1732 the boy attended a Jesuit seminary at Komotau, where he was taught singing, violin, cello, and organ. In the latter year he went to Prague to continue his musical studies and was compelled to eke out a livelihood by playing in the neighboring villages. While there, he heard and stored away in his memory many rustic tunes which later did service in his operas. Czernohorsky, noting his aptitude, took him as a pupil. In 1736 he went to Vienna, where, through the good offices of the Lobkowitz family, he met Prince Melzi. The latter became deeply interested in the young musician and took him to Milan, where Gluck continued his technical studies with Sammartini.

Gluck was 27 years old when his first opera, *Artaserse*, was produced at La Scala. *Artaserse* led to commissions for other works, and within five years Gluck produced eight operas. His fame having reached England, he went to London in 1745 at the invitation of Lord Middlesex and produced *La caduta de' giganti* in honor of the Duke of Cumberland's victories. The time, however, was inauspicious, and *The Fall*

of the *Giants* was withdrawn after only five performances. The performances of an earlier opera, *Artamene*, were more successful, while a *pasticcio*, *Piramo e Tisbe*, an opera loosely strung together from the best arias of his earlier works, met with a complete fiasco.

In 1748, Gluck's father having died and left him a small inheritance, he settled in Vienna, which remained his principal place of residence for the rest of his life. On May 14, 1748, in celebration of the Empress's birthday, he produced in the recently completed opera house *La Semiramide riconosciuta*, which achieved great success. The spring of 1749 found the composer in Copenhagen, where he was received with distinction and lodged in the royal palace, and where he produced a two-act serenade, *Tetide*, in honor of the recent birth of a Crown Prince (afterward Christian VII). In April of the same year he traveled in the guise of a Capuchin (for no other reason, it is believed, than to avoid trouble regarding passports) to Rome. There and in Naples he brought out a new two-act opera, *Telemacco, ossia l'Isola di Circe*, which was attended with his usual success.

Shortly afterward Gluck returned to Vienna, where, in September, 1750, he married Marianne Pergin. They soon left Vienna for Naples, where he achieved great success with his opera *La clemenza di Tito*. In 1754, having produced, and again successfully, two operas, *Il Trionfo di Camillo* and *Antigone*, in Rome, the Pope created him Chevalier of the Golden Spur, and thereafter the composer, who set great store by this title, was always careful to call himself Ritter von Gluck. Previous to this visit to Rome he had been appointed by Count Durazzo conductor of the Opera at Vienna. His productivity in this office was great, including the composition of light operas whose librettos Durazzo secured from Paris, where they were brought out with music usually by Duni and Monsigny, while the Viennese heard the same librettos with music by Gluck. Meanwhile Gluck was growing steadily in intellectual breadth. He became more and more dissatisfied with the flippant conventionalities of the Italian opera of the day, though he himself had composed an appalling number of works in that style. About 1760 he met Raniero di Calzabigi, a real poet, who held very decided views as to the possibilities of music when wedded to a real drama. It was he who furnished Gluck with the libretto to *Orfeo ed Euridice*, the first of the "reform" operas, produced in Vienna, Oct. 5, 1762. This, his first great opera, is still a famous work. Though not immediately successful, *Orfeo* soon established itself in popular favor, not only in Vienna, but also in Italy, where, at Parma, Traetta was unable to obtain a hearing for his *Armida* because every one wanted to hear *Orfeo*. Gluck's other operas in his great style are *Alceste* (1767), *Paride ed Elena* (1769) (both on texts by Calzabigi), *Iphigénie en Aulide* (Paris, 1774), *Armide* (1777), and *Iphigénie en Tauride* (1779).

The production of *Iphigénie en Aulide* in Paris was an important event in Gluck's life. It led to the hotly waged and now historic contest between the operatic reformers headed by Gluck and those who championed the existing style of opera. The latter put forward Piccini to oppose Gluck, but Gluck was overwhelmingly victorious. In 1780 he returned to Vienna, but ill health prevented him from accomplishing

anything of importance, and he died in that city, Nov. 15, 1787. Gluck's reform of the opera was his greatest service to music. He found it marred by senseless embellishments, and a mere vehicle for the display of singers' voices; he left operatic music restored to its original purpose of expressing musically the meaning of the words to which it was composed and of emphasizing the dramatic situation, and in this reform the share of Calzabigi is scarcely less important than that of Gluck himself. In two prefaces, printed in the scores of *Alceste* and *Paride ed Elena*, the master explains his views in detail. Consult: A. B. Marx, *Gluck und die Oper* (Berlin, 1863); E. Newman, *Gluck and the Opera* (London, 1895); A. Reissman, *Christoph Willibald von Gluck* (Berlin, 1882); J. d'Udine, *Gluck, biographie critique* (Paris, 1906); J. Tiersot, *Gluck* (ib., 1910).

**GLÜCKSBERG**, DUKE OF. See DECAZES, L.

**GLÜCKSTADT**, glük'shtát. A town in the Prussian Province of Schleswig-Holstein, on the Elbe, 32 miles below Hamburg (Map: Germany, C 2). It is intersected by canals; has a Gymnasium, railway repair shops, shipyards, fruit and vegetable canneries, manufactories of furniture, wagons, mirrors, soaps, shoes, saddlery, bricks, cigars, etc. The fisheries are important. When the Elbe is icebound the harbor, which is large and deep, receives much of the Hamburg shipping. Glückstadt was founded in 1617 by Christian IV of Denmark, fortified, and endowed with various commercial privileges. During the Thirty Years' War it successfully withstood three sieges; its fortifications were demolished by the allies in 1815. Pop., 1900, 6586; 1910, 6555.

**GLUCOSE** (from Gk. γλυκύς, *glykys*, sweet). Glucose is a carbohydrate, and it is customary to speak of this simple sugar also as dextrose and grape sugar. The latter name is given to it on account of its occurrence in the juice of the grape and of other ripening fruits and also to distinguish it from cane or beet sugar. It is also contained in honey. In the vegetable kingdom it is widely distributed, where it plays an important rôle in the economy of plant life. It is also found in the animal body, and the human blood may have as much as 0.1 per cent under healthy conditions.

The molecular formula of glucose is  $C_6H_{12}O_6$ , and it is called a carbohydrate because the molecule contains carbon, hydrogen, and oxygen, the H and O being present in the same proportion as in water ( $H_2O$ ).

Glucose can be readily prepared from starch by hydrolyzing with dilute sulphuric or hydrochloric acid. It may also be prepared from cellulose and cane (sucrose), beet (sucrose), milk (lactose), or malt (maltose) sugar, but in most of these cases other sugars are split off with the dextrose. Thus cane or beet sugar when treated with an acid or the ferment invertase (present in yeast) yields equal parts of glucose and levulose. The name "invert sugar" is given to the products of hydrolyzation of cane or beet sugar. Levulose accompanies dextrose in the juice of fruits.

In appearance chemically pure glucose is white, and it is less sweet in taste than cane sugar. Unlike cane sugar, it never separates in well-defined, clear crystals from either water or alcohol. It is usually met with as a crystalline, crusty powder. It is very soluble in water and less so in ethyl and methyl alcohol.

Either glucose anhydride or hydrate crystallizes from strong concentrated aqueous or strong alcoholic solutions at temperatures of 30° to 40° C. and as hydrate from water at room temperature. The needle-like crystals of the anhydride melt at 140° C. and the hydrate at 80 to 100° C. (176° to 200° F.).

Glucose deflects the ray of polarized light to the right (dextroglucose) and when first polarized shows a variable rotation (mutarotation), which rises or sinks to a constant level after a number of hours. Glucose reduces cupric hydroxide (mixed Fehling's solution) to copper oxide. This fact and the degree of polarization are utilized when determining glucose in foods, etc. Heating glucose with a decinormal sodium hydroxide solution for a number of hours at 37° C. destroys it. Cane sugar when present in the same solution is not decomposed, and this constitutes a method for separating cane sugar from glucose. By heating glucose at a temperature of 170° C. or over, it becomes brownish and loses much of its sweetness and is converted into glucosan ( $C_6H_{10}O_5$ ). When heated between 200 and 220° C., it is converted into caramel, a brown coloring matter principally employed for coloring artificial vanilla extract, beers, whiskeys, confectionery, etc.

On oxidation glucose yields three acids, viz., gluconic, glucuronic, and saccharic. Physiologically considered, glucuronic acid is the most interesting because it is frequently found in the urine combined with a variety of substances and in the sugar beet combined with a resin acid.

Under normal conditions glucose is rapidly oxidized in the animal body, to which it furnishes heat and energy.

Glucose is fermentable by the zymase contained in yeast and also by the ferments of some molds and bacteria. Before starch, malt, or cane sugar can be fermented, it is necessary to convert the first two into glucose, and cane sugar into glucose and levulose. Upon the fermentability of glucose by yeast the manufacture of alcohol, wine, beer, distilled liquors, cider, and bread depends. (See BEER.) Alcohol is not always the final product resulting from the fermentation of glucose, and in many cases lactic acid, acetic acid (see VINEGAR), and butyric acid are formed.

**Commercial Glucose.** The first person to prepare sugar from grapes was Proust (1800-01); but, according to Wichelhaus, Kirchhoff must be regarded as the real discoverer of the conversion of starch into glucose. According to Gaissicourt, however, Fourcroy and Parmentier in 1781 produced sugar from starch, but the value of the reaction was not appreciated at that time.

In the United States the term "glucose" to the brewer, candy maker, leather manufacturer, etc., has come to mean an almost transparent, sirupy liquid composed of dextroglucose, maltose, dextrin, and water prepared from cornstarch by heating with dilute acids. In Europe, especially in Germany, the product is usually prepared from potato starch and takes the name of starch sirup. Quite often cornstarch is prepared in the same establishment where glucose is manufactured, and here the two processes make up a large industry.

For the manufacture of glucose from corn, the grain is first softened by treatment, for two or three days, with water containing a small per-

centage of sulphurous acid, then coarsely ground, and then treated with "starch milk" (a mixture of starch and water) of such a density that the lighter embryos, or "germs," float on the surface, whence they are removed, while the heavier parts of the kernels sink to the bottom of the liquid. The "germs" are dried and sold for stock feed after the extraction by hydraulic pressure of the oil they contain. This oil is found in commerce under the name of corn oil, or maize oil. The parts of the kernel that sink are finely ground. The starch is thus set free, so that it can be separated from the ground grain by washing on sieves. It is afterward purified by successive mixing with water and sedimentation, or by deposition on "starch tables," over which the washings from the sieves are allowed to flow. The starch, which is much heavier than water and the impurities from which it is to be freed, collects at the bottom of the settling vats in a hard white layer which, when drained, is called "green starch" and is ready for conversion into glucose. The residue retained by the sieves and the nitrogenous matter, as well as the small amount of starch left in the wash waters, are collected, pressed, dried, and sold for stock feed. See GLUTEN MEAL AND GLUTEN FEED.

For converting the starch into glucose (hydrolysis), sulphuric acid is now very generally used. For certain products sulphuric acid in mixture with a minute quantity of nitric acid is employed. Hydrochloric and oxalic acids are also used for this purpose. The operation is conducted in steam-heated, closed copper "converters," under a pressure of two or three atmospheres (30 to 45 pounds per square inch). This high pressure greatly lessens the quantity of acid and time necessary for conversion. In the case of sulphuric acid from one to three pounds are used per 100 pounds of dry starch; in the case of hydrochloric acid only one-half to three-quarters of a pound of the concentrated acid is necessary. The starch is mixed with a considerable quantity of water before the acid is added; the time required for the conversion varies from 10 to 30 minutes, according to the character of the required product. By the action of the acid the starch is first converted into dextrin and maltose; by continued treatment these bodies are changed to dextroglucose. As the liquor comes from the "converter," the acid is neutralized with chalk or marble dust, if sulphuric acid is used, or with soda if hydrochloric acid is used. In the former case the gypsum, or sulphate of lime, formed crystallizes out and is separated by filtration; in the case of hydrochloric acid the neutralization product is sodium chloride (common salt). This product cannot be used for all purposes on account of its salty taste. The neutralized liquid is decolorized by filtration through boneblack and concentrated in vacuum evaporators to form a sirup.

Other products manufactured in glucose factories from starch are solid substances rich in dextrose (glucose) and containing a minimal amount of dextrin and maltose. These are the so-called grape sugars of commerce. In manufacturing these products the time required for heating with dilute acid is longer than for making glucose sirup. The products occur in the hydrous and anhydrous forms.

The following analyses of starch sugar products are taken from *Bulletin 66* of the Bureau of

Chemistry, United States Department of Agriculture:

COMPOSITION OF COMMERCIAL GLUCOSE AND STARCH SUGAR

DESCRIPTION	Water	Ash	Dextrose	Maltose	Dextrin
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Neutral glucose sirup	18.00	.259	14.00	33.40	30.99
XXX glucose	18.34	.459	14.53	38.24	26.53
70 per cent sugar	18.56	.837	68.71	1.79	2.89
80 per cent sugar	10.34	.796	79.28	.90	3.68
Anhydrous grape sugar	6.18	.351	86.43	2.02	.88

According to the thirteenth census the amount of glucose manufactured during 1909 was 769,660,210 pounds, and its value was \$17,922,514. The grape sugar manufactured during the same year amounted to 159,060,478 pounds and had a value of \$3,620,816. In 1904 the money value for each of these commodities was \$12,352,616 (glucose) and \$2,254,745 (grape sugar).

Among the products of glucose factories those of greatest commercial importance are "mixing glucose," used by sirup and molasses manipulators; "jelly glucose," used in making jellies from evaporated apple juice and other materials; "confectioners' glucose"; "brewers' glucose," used as a substitute for malt in brewing; and "anhydrous grape sugar." Well-made glucoses must be regarded as a perfectly wholesome product, as they are composed of substances of frequent and abundant occurrence in foods that have been in use from time immemorial, and which are similar to the products into which starch is normally transformed by the processes of digestion. The objection to their use in the preparation of foods lies mainly in the fact that the consumer is frequently misled in regard to the value of the commodities containing them, and that they are frequently used in the fabrication of inferior, artificial or highly diluted, or otherwise adulterated goods.

Consult: Wagner, *A Practical Treatise on the Manufacture of Starch, Glucose, Starch-Sugar, and Dextrin*, translated by Frankel and Hutton (Philadelphia, 1881); Hallock, *Bibliography of Starch-Sugar* (Washington, 1884); O. Hammarsten, *A Text-Book of Physiological Chemistry*, trans. by J. A. Mandel (New York, 1909); *Thirteenth Census of the United States Taken in the Year 1910: vol. x, Manufactures, 1909, Reports for Principal Industries*; E. F. Armstrong, *The Simple Carbohydrates and the Glucosides* (New York, 1912); H. Wichelhaus, *Der Starkezucker* (Leipzig, 1913); B. Tollens, *Kurzes Handbuch der Kohlenhydrate* (ib., 1914).

**GLUCOSIDE**, glŭŭ'kō-sīd. A name given to a number of complex organic substances which occur principally in the plant kingdom. As a class, they are generally colorless, crystalline, bitter substances and can be obtained by extracting the plant with water or alcohol. They have the common property of yielding a sugar—usually glucose—when decomposed with either an acid or appropriate ferment, and one or more organic substances classed with the alcohols, aldehydes, phenols, etc. Thus, amygdalin found in bitter almond, the kernels of the peach, apricot, plum, and other stone fruits belonging to the Rosaceæ, when treated with the ferment emulsin, is decomposed into glucose, benzaldehyde, and hydrocyanic acid. In most cases the ferment which

hydrolyzes the glucoside is present in the same plant or seed, but in different cells. Glucosides which give off hydrocyanic acid, a strong poison, are termed cyanogenetic, and their detection is a matter of the utmost importance when they occur in beans used as a food for man and in animal fodders.

Digitonin, a glucoside contained in *Digitalis purpurea* (foxglove), a heart stimulant, on decomposition yields when decomposed (hydrolyzed) both glucose and galactose, while hesperidin, found in the unripe orange, and quercitrin, in the black oak (*Quercus tinctoria*), yield a pentose sugar called rhamnose.

Again salicin, a glucoside, the active principle of willow bark and used as a remedy against fever and rheumatism, is hydrolyzed by emulsin to glucose and saligen, and gaultherin, contained in *Gaultheria procumbens*, yields methyl salicylate, which is essentially oil of wintergreen. Sinagrin and sinalbin, found in black and white mustard respectively, when hydrolyzed by myrosin, yield mustard oils, glucose, etc.

The real biological function of glucosides in the economy of the plant is not known, but is suggested as protective. Many of the glucosides have been produced artificially. Consult Haas and Hill, *An Introduction to the Chemistry of Plant Products* (New York, 1913), and E. F. Armstrong, *The Simple Carbohydrates and the Glucosides: Monographs on Biochemistry* (ib., 1912).

**GLUE** (from OF. *glu*, bird lime, from Lat. *glus*, *gluc*, connected with Gk. γλούς, *glōtos*, glue, Eng. clay). An inferior grade of gelatin, prepared on account of its adhesive qualities, for use in the arts and industries and particularly in the various branches of woodworking. A preparation of glue or other gelatinous material for glazing the surface of a textile fabric, paper, or other material is known as "size." With the development of the textile, paper, and allied industries, the use of glue as sizing has enormously increased the demand for this article and its consequent commercial importance. The best glue-making material is the corium, or true skin of the animal, that portion lying beneath the epidermis and inner layer of fat, which is also used for the manufacture of leather. The glue extracted from the bones of animals is inferior in adhesive qualities unless prepared by the acid process, which is expensive. The softer bones of an animal yield the better glue. Fish glue is made from the skin, scales, and muscular tissue of some of the larger fish, especially cod, and is, of course, a very different product from true isinglass (q.v.). In its adhesive powers it resembles hide glue, but it retains an offensive odor. The raw material of most glue factories is chiefly composed of the waste from slaughter-houses and from leather manufactories—the trimmings of hides and bones, and scraps of leather or pieces of old leather which was cured by some other process than tanning. Glue, however, cannot be made from material in which the slightest trace of tannic acid remains.

The method of glue manufacture varies with the character of the material employed. In making glue from hide the scraps are first limed, to facilitate the removal of adhering hair, flesh, and fat, as in the manufacture of leather (q.v.). This process requires from 10 to 40 days, after which the skins are washed and dried. Instead of lime, caustic soda or sulphurous acid is sometimes used for cleansing the glue stock. The



prepared stock is converted into glue by the application of heat, and the solution, separated from the impurities and foreign matter, is filtered off and concentrated, after which it is cooled in thin layers on flat surfaces. By an older method the pieces are placed in flat-bottomed copper boilers, which have perforated false bottoms placed a little above the true ones, to prevent the burning of the materials. The whole is kept at a gentle boiling heat until the gelatinous part has boiled out, and the mass of the material has sunk down into the fluid. The boiler is at first filled with soft water for two-thirds of its depth. The boiling is sustained until, by repeated trials of small quantities, the operator knows the fluid to be of the right consistency, when it is drawn off to the congealing boxes: a fresh lot of material is often added to the residue left in the boiler, and the process is repeated. Recently the use of steam, either indirectly in closed pipes or directly in perforated pipes, or else blown under high pressure directly into the closed vessel containing the mixture, has been found to expedite the process and improve the quality of the glue. After boiling, the glue is allowed to settle, or is strained through linen bags to free it from impurities. The waste thus recovered, consisting of fat, hair, and other matter, is utilized in the manufacture of fertilizers, while the glue itself is subjected to a process of drying. Drying is likely to prove a troublesome process, requiring great care, as the glue readily spoils at this stage. Once drying was accomplished in the open air, but recent practice is to place the glue in specially prepared drying rooms, where the temperature and humidity can be carefully regulated. The glue is dried in shallow wooden molds, or "coolers," and the tablets are laid in wire netting. Thence it is removed to a smooth-topped table, whose surface has been moistened to prevent sticking, and here it is cut, by means of wires, into pieces of the desired shape and size. Fish glue is made by a similar process of treating with hydrochloric acid, washing, liming, and boiling with water.

Bone glue is extracted by boiling the bones, which have been previously treated with a solution of hydrochloric acid, to remove the calcium phosphate. The powdered bones are kept in a solution of dilute hydrochloric acid for several days. They are then allowed to stand in lime water for a few hours, after which the gelatin is extracted by means of boiling water or steam, as in the preparation of hide glue. The calcium phosphate recovered from the bones is used as fertilizing material, and the fat is also utilized.

Liquid glue is prepared from a solution of dried glue by the action of nitric or acetic acid, which checks its tendency to gelatinize without diminishing its adhesive qualities. An excellent liquid glue may be made by mixing four parts of transparent gelatin, four parts of strong vinegar, one part of alcohol, and a small amount of alum. Consult Taggart, *The Glue Book* (Toledo, O., 1913).

The glue industry in the United States dates from 1837, when Peter Cooper produced the first American-made glue. Since that time it has developed steadily, and the thirteenth United States census of manufactures (1913) reported that in the year 1909 the glue industry embraced 65 establishments, employing an average number of 3265 wage earners, with an annual product valued at \$13,717,820—an in-

crease in the value of product from 1899 of 154.6 per cent. Illinois ranked first, in 1909, in the value of its product, supplying 27.5 per cent of the total, being followed by New York and Pennsylvania with 21.8 per cent and 14.0 per cent respectively. The 65 establishments had an aggregate capital of \$14,288,674, with aggregate expenses for the year of \$11,759,336.

A series of tests of ordinary glue were reported before the 1914 meeting of the American Society for Testing Materials by O. Linder and E. C. Frost. In making the tests they considered the principal qualities to be covered were: viscosity of the melted solution, strength of the cold jelly (judged by the fingers), odor, reaction, grease content, liability to foaming, ash, moisture, appearance. The method of testing was to glue a  $2 \times 1 \times 1$  inch block between two  $2 \times 1 \times 1\frac{1}{2}$  inch pieces, pressing together under 100 pounds' pressure for 12 hours, and after another 12 hours pushing the middle block from between the others on a testing machine. It was found that in the 25 samples tested the strength developed varied from 1100 to 1950 pounds per square inch for one part dry glue to three parts of water, and 60 to 70 per cent of this amount for a one to five glue. It was further found that prolonged heating of glue lowered its strength, and, if kept heated to  $150^{\circ}$  F. for 20 hours, a loss of from 20 to 45 per cent in strength was shown in testing. Consult: Davidowsky, *Glue, Gelatine, Cements, and Pastes* (Philadelphia, 1905); Lambert, *Glue, Gelatine, and their Allied Products* (London, 1905); Fernback, *Glues and Gelatine* (ib., 1907); Standage, *Agglutinants of All Kinds* (ib., 1907).

**GLUE, MARINE.** A waterproof cement made by dissolving one part of finely divided pure gum rubber in 12 parts of naphtha or benzine, adding 20 parts of powdered shellac, and digesting at a gentle heat until the shellac is dissolved. The hot fused mass is poured on plates of metal or stone, and allowed to cool in thin sheets. For use, it is melted and applied with a brush. Owing to its property of resisting moisture, it is much used in shipbuilding, to unite surfaces exposed to water, and is also valuable as a cement for glass, metal, and stone.

**GLUGÆA BOMBYCIS**, glō-jē'a bōm-br'ās. A parasite of the silkworm, which formerly did immense injury to the silk industry of France.

**GLUKHOV**, glōō'kōv. The capital of a district of the same name in the Russian Government of Tchernigov, situated on the Yesmana, 180 miles south-southeast of Tchernigov (Map: Russia, D 4). The chief occupation is agriculture; the trade is insignificant. The town existed as early as the twelfth century and passed to Lithuania in the fourteenth century and later to Poland. It was the seat of the hetmans of Little Russia. Pop., 1897; 14,856.

**GLUME**, glōōm (Lat. *gluma*, husk, from *glubere*, to peel, Gk. γλύφειν, *glyphein*, to carve). The characteristic bract which distinguishes the inflorescence of grasses, which on this account are often spoken of as "glumaceous plants." See GRAMINEÆ.

**GLÜMER**, glu'mēr, ADOLF VON (1814-96). A German soldier. He was born at Lengefeld and, entering the Prussian army in 1831, won rapid promotion, participated in the Austro-Prussian War of 1866, and then was commander of the Thirty-second Infantry Brigade. In the Franco-German War he especially distinguished



himself, serving as a division commander at Spichern, Forbach, Gravelotte, and Metz, and taking a prominent part in the battle around Belfort. In 1873 he was Governor of Metz and retired from active service. In 1878 the German Emperor intrusted him with the task—which he had to give up in 1880—of unifying the Imperial army.

**GLÜMER, CLAIRE VON** (1825–1906). A German author, born at Blankenburg in the Harz Mountains and educated chiefly in France. Her translations include works of Swift, Daudet, George Sand, Turgenev, Tolstoy, and others. Among her novels and romances are: *Düstere Mächte* (1870); *Vom Webstuhl der Zeit* (1882); *Junge Herzen* (1890); *Es giebt ein Glück* (1897). The story of her childhood is told in *Aus einem Flüchtlingsleben* (1904).

**GLÜTEN** (Lat., glue). One of the most important constituents of the varieties of grain used as food. It is obtained by mixing flour with water and thus forming a paste or dough. This paste is placed in a bag of fine linen and kneaded in water, which must be repeatedly changed, till it ceases to assume a milky appearance. A gray, tenacious, viscous, tasteless substance, having the appearance of birdlime, is left in the bag. This substance consists mainly of gluten, mixed with traces of bran starch and of oily matter. The gluten thus obtained from wheat and from rye is far more tenacious than that which is obtained from the other cereals, and it is the great tenacity of this constituent that especially fits these flours for conversion into bread. It is found, by analysis, that the proportion of gluten contained in wheat grown in hot countries is considerably higher than in wheat grown in colder countries; and the hard, thin-skinned wheats contain more of this ingredient than the softer varieties of the grain. The quantity of gluten usually found in flour varies from 8 to 15 per cent. Gluten in a moist state rapidly putrefies, the mass acquiring the smell of decaying cheese; but when dry, it forms a hard, brownish, horny-looking mass, that does not very readily decompose. Gluten is composed mainly of two protein substances, *gladin* and *glutenin*, which are present in approximately equal quantities. The action of gluten in the manufacture of bread is probably a double one; it induces, by constant action, an alteration of the starch, and subsequent fermentation, while by its tenacity it prevents the escape of carbonic-acid gas.

The large quantities of gluten obtained as a by-product in the manufacture of starch are at present utilized for the manufacture of certain articles of food. The cohesive properties of gluten are destroyed, or rather suspended, by the action of dilute acids or alkalis, but are restored again by the addition of salts. Wet gluten, when first extracted, contains two parts by weight of water for every one part of true gluten.

**GLUTEN MEAL AND GLUTEN FEED.** By-products resulting in the manufacture of starch or glucose from the starch of the corn kernel. Their principal use is as a feeding stuff for farm animals. The products differ greatly in composition according to the process of manufacture which is followed. Gluten feed is the entire residue of the kernel, including the germs and hulls. Gluten meal, cream gluten, and similar materials sold under a variety of trade names, do not contain the corn hulls. Some fac-

tories extract a part of the fat from the gluten meal; others mix the gluten meal with the hulls and germs without extracting the fat and sell it as gluten feed. The dried products from the same factory vary considerably in composition from time to time, so that although a very large number of samples of gluten meal and feed have been analyzed by the experiment stations, no very constant figures can be given for percentage composition. In general, the gluten meals are richer than the gluten feeds. These meals contain from 20 to 40 per cent of protein, the average being about 30 per cent, and from 6 to 20 per cent of fat, with an average of nearly 12 per cent. The carbohydrates constitute about 45 per cent, and the fibre varies with the completeness of the separation of the hulls, rarely amounting to over 3 or 4 per cent. The gluten feeds usually contain about 24 or 25 per cent of protein, although the product from some factories has been below 20 per cent and of others over 30 per cent. The fat varies less than in gluten meal, averaging about 10 per cent; and the carbohydrates are higher, averaging over 50 per cent. Like other corn products, none of these materials contain much ash—less than 1 per cent usually.

Gluten meal and feed are both quite digestible, from 85 to 90 per cent of the protein, 90 to 95 per cent of the carbohydrates, and 85 to 95 per cent of the fat being digested by ruminants. They are highly prized as feeding stuffs, especially for dairy cows, and are now very extensively used over the northeastern part of the United States. Gluten meals, when fed to cows in considerable quantity, cause a slight softening of the butter, but give a product of good quality. Gluten meal is also a satisfactory feed for fattening steers and for pigs.

**GLUT HERRING.** A "river herring" (*Clupea astivalis*), closely related and similar to the alewife and often confused with it in the market, although considered inferior. It is more commonly known on the New England coast as "blueback."

**GLUTIN.** See GELATIN.

**GLUTTON.** The English name for the European representatives of the circumpolar carnivore known in North America as the wolverine (*Gulo luscus*). The fables to which it owes its name, and the equivalents in all European languages, are sketched and considered by Dr. Elliott Coues in his *Fur-Bearing Animals* (Washington, 1877). In the early books about animals this denizen of forests, popularly supposed to be more or less filled with hobgoblins anyhow, was represented as a ravenous monster of insatiate voracity, matchless strength, and supernatural cunning. For the real character of the animal whose name perpetuates these foolish calumnies, the reader is referred to the article WOLVERINE, and the Plate of FUR-BEARING ANIMALS.

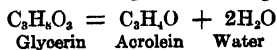
**GLYCERIA.** See MANNA GRASS.

**GLYCERIN**, glis'ēr-in, **GLYCEROL**, glis'ēr-ōl (from Gk. γλυκερός, *glykeros*, sweet, from γλυκός, *glykys*, sweet), or PROPENYL ALCOHOL, C<sub>3</sub>H<sub>5</sub>(OH)<sub>3</sub>. An organic chemical compound, used for a variety of purposes in the arts and in medicine. Perfectly pure glycerin is a crystalline solid substance melting at 17° C. (62.6° F.); but the merest traces of impurities prevent it from crystallizing, and it is therefore usually obtained in the form of a thick sirupy liquid that boils at 290° C. (554° F.). Small

quantities of salts cause it to decompose to some extent when distilled. Glycerin mixes in all proportions with water and alcohol and readily absorbs moisture if exposed to the air, but, owing to the three hydroxyl groups contained in its molecule, it does not mix with ether, chloroform, carbon disulphide, benzene, and many other organic liquids. On the other hand, it forms an excellent solvent for a variety of substances, both inorganic and organic. It is colorless and odorless, but has a distinctly sweet taste. Its specific gravity at 15° C. (59° F.) is 1.265. Glycerin is obtained in large quantities in the manufacture of soap and of candles. It is well known that natural fats are largely used in the manufacture of these products, and as fats consist mainly of glycerides, i.e., compounds of glycerin with fatty acids, glycerin is set free when the fats are decomposed, or "saponified." It is thus obtained, in more or less dilute aqueous solution, through the saponification of fats with lime or with superheated steam. To separate the glycerin from the dilute solution, the latter is somewhat concentrated by evaporation, filtered through boneblack, and then further evaporated *in vacuo*. To render it fit for use in medicine and in the manufacture of nitroglycerin, the product thus obtained is further purified by distillation with superheated steam before it is brought into the market. Finally, to eliminate, for scientific purposes, the last traces of impurities in the commercial product, the latter may be again mixed with water, filtered through carefully purified boneblack, and evaporated *in vacuo*. In medicine glycerin is used chiefly as a vehicle for applying externally many substances, such as the alkalies, neutral salts, bromine, iodine, alkaloids, tannic acid, etc., the glycerin solutions of which are readily absorbed by the skin. If injected into the rectum, glycerin relieves constipation, its action being speedy, painless, and followed by no constitutional disturbance. Very large doses of glycerin taken internally are liable to cause loss of muscular strength, lethargy, and even death. In the arts glycerin is employed mainly in the manufacture of nitroglycerin, from which many valuable modern explosives are made; nitroglycerin is the trinitrate of glycerin,  $C_3H_5(NO_3)_3$ , obtained by the action of a mixture of nitric and sulphuric acids on glycerin. Glycerin is further used as a preservative fluid for small and delicate anatomical preparations and has been applied to the preservation of meat and other foods; it has been added to the water in gas meters, with the view of preventing it from freezing in winter and from evaporating too rapidly in summer. It is also used in the manufacture of toilet soap, of parchment paper, and of printers' rollers, in the textile industry, etc.

Chemically glycerin is a triatomic alcohol, its constitutional formula being  $CH_2(OH)CH(OH)CH_2(OH)$ . When the hydrogen of its hydroxyl groups is replaced by metals or by organic acid radicals, alcoholates or esters respectively are obtained. Fats are mixtures containing, in various proportions, mainly the esters which glycerin forms with oleic, palmitic, and stearic acids. The hydroxyl groups of glycerin may be readily replaced by chlorine or bromine, one or two atoms of chlorine being thus substituted by the direct action of hydrochloric acid, while the third hydroxyl group may be replaced by chlorine by the action of

phosphorus pentachloride. Besides the method described above, by which glycerin is made on an industrial scale, it may be prepared by the action of potassium permanganate on allyl alcohol, and it is produced in small quantities during the alcoholic fermentation of sugars. By the action of acid potassium sulphate or other dehydrating agents on glycerin, or simply by distilling impure glycerin under ordinary atmospheric pressure, acrolein is produced according to the following chemical equation:

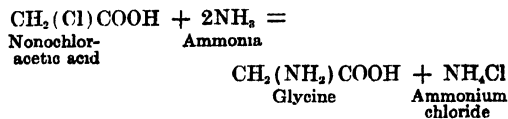


When carefully oxidized with dilute nitric acid, glycerin is transformed into glyceric acid,  $CH_2(OH)CH(OH)COOH$ . Usually, however, the products of oxidation of glycerin are oxalic, carbonic, and glycollic acids.

Glycerin was discovered by Scheele in 1779; Chevreul demonstrated its existence, in the form of glycerides, in the fats; its composition was determined by Pelouze, and its chemical constitution by Berthelot and Wurtz. Finally, Charles Friedel, in collaboration with Silva, succeeded in effecting the complete synthesis of glycerin from its chemical elements; their method, however, is too complicated to be described here.

Imports of glycerin into the United States are about 35,000,000 pounds annually, valued at about 12 cents per pound. In 1913 imports were 34,414,000 pounds, chiefly from France and England.

**GLYCERRHIZA**, glis'ēr-rī'zā. See LICORICE.  
**GLY'CINE** (from Gk. γλυκός, *glykys*, sweet), GLYCOCINE, GLYCOCOLL. SUGAR OF GELATIN, or AMINO-ACETIC ACID,  $CH_2(NH_2)COOH$ . An organic chemical compound of carbon, hydrogen, oxygen, and nitrogen, discovered by Braconnot in 1820. It forms colorless, transparent, rhombic prisms, which have a sweet taste and are devoid of odor. It is very soluble in water, but is insoluble in alcohol and in ether. Glycine combines both with acids (as hydrochloric, nitric, sulphuric, and oxalic acid) and with metallic oxides, and the compounds in both cases are soluble and crystallizable; they are, however, of no great importance. Glycine is usually prepared by subjecting hippuric acid to prolonged boiling with hydrochloric acid, benzoic acid being produced at the same time. It is also sometimes prepared synthetically, by the action of ammonia, or ammonium carbonate, upon monochloroacetic acid, according to the following chemical equation:



Glycine exists in the animal body only in combination; it is one of the chemical components of hippuric acid and glycollic acid, two substances of considerable physiological importance. It is, further, one of the products obtained by boiling gelatin with acids or with alkalies and is produced also when uric acid is subjected to the action of hydriodic acid.

**GLY'COCINE**. See GLYCINE.

**GLY'COCOLL**. See GLYCINE.

**GLY'COGEN** (from Gk. γλυκός, *glykys*, sweet + -γένεσις, *-genesis*, producing, from γίγνεται, *gignesthai*, to be born), or ANIMAL STARCH.

An organic substance found in small amounts in all tissues of the body, lymphoid, blood, and pus cells. In larger quantities it is found in the liver of mammals, particularly after the ingestion of large quantities of carbohydrate food. It is also found in large amounts in the muscles of mollusks, oysters, clams, and scallops.

Glycogen is a carbohydrate closely related to the starches or dextrins, with the general formula  $(C_6H_{10}O_5)_n$ . It forms an amorphous, white, tasteless, and inodorous powder. With water it gives an opalescent solution which is dextrorotatory, the specific rotation being  $[\alpha]_D = +196.57^\circ$ . The solution is colored wine red by the addition of iodine. Glycogen is separated out of its solutions by various reagents, such as, barium hydrate, acetic acid, tannic acid, and phosphotungstic acid. It may be salted out of its solutions by means of either magnesium sulphate or ammonium sulphate. Boiling with dilute mineral acids converts glycogen, like starch, gradually into dextrose. This is also accomplished by diastatic enzymes present in various plant and animal tissues and animal secretion. Yeast does not ferment glycogen into alcohol. This is, however, accomplished by yeast press juice which contains diastatic enzymes which first convert glycogen into dextrose. The conversion of glycogen into dextrose may also be accomplished by photocatalysis and by electrolysis. The heat of combustion of glycogen has been determined for 1 gram = 4190 cal., and for 1 gram molecule = 678.9 cal. It may be prepared by plunging into boiling water, immediately after death, the liver of an animal (rabbit) which has been fed on large amounts of carbohydrates. The organ is then macerated and boiled several times with fresh water. The combined filtered extracts are concentrated and allowed to cool. The proteids are removed from it by alternate precipitation with potassium mercuric iodide and hydrochloric acid. From this solution the glycogen is precipitated by the addition of large volumes of alcohol. The uses of glycogen in the animal economy are noticed in the article LIVER (q.v.).

**GLYCOL** (from *glyc-erin* + *alcoh-ol*), or more properly, **ETHYLENE GLYCOL**,  $C_2H_4(OH)_2$ . A thick liquid, having a sweet taste and boiling at  $197.5^\circ C.$  ( $387.5^\circ F.$ ). It cannot be mixed with ether, owing to the two hydroxyl groups (OH) contained in its molecule; but mixes in all proportions with water and ordinary alcohol. It may be prepared by heating ethylene dibromide with an aqueous solution of potassium carbonate, evaporating the resulting solution at a gentle heat, extracting the semisolid residue with a mixture of alcohol and ether, and subjecting the solution thus obtained to fractional distillation. Ethylene glycol is the simplest substance of the group of glycols, or diatomic alcohols, a general description of which may be found under ALCOHOLS. A detailed account of the glycols was given by their discoverer, Adolphe Wurtz, in a lecture delivered before the Chemical Society of Paris. Consult Pasteur, Cahours, Wurtz, etc., *Leçons de chimie professées en 1860* (Paris, 1861).

**GLYCOLIC ACID**, or **HYDROXYACETIC ACID**,  $CH_2(OH).COOH$ . A compound of carbon, hydrogen, and oxygen, which is at once an acid and a primary alcohol. It may be prepared from monochloroacetic acid by boiling a concentrated solution of its potassium salt in water for a number of hours, then distilling off

most of the liquid under reduced pressure, and diluting the residue with acetone: at first potassium chloride separates out, but after that the filtered mother liquor deposits a mass of crystals of glycolic acid. Pure glycolic acid melts at  $78.9^\circ C.$  ( $174^\circ F.$ ). Glycolic acid is contained in beet juice and is the principal acid constituent of sugar-cane juice.

**GLY'CON** (Lat., from Gk. *Γλύκων*, *Glykōn*). An Athenian sculptor, who lived probably in the first century A.D. He executed the celebrated colossal marble statue of the Farnese Hercules, discovered in the baths of Caracalla in 1540. After adorning the Farnese Palace for some time, it was removed to the Royal Museum at Naples. It represents the hero resting on his club after one of his labors and is supposed to have been copied from the Heracles of Lysippus (q.v.). No ancient writer mentions Glycon, but ΓΑΤΚΩΝ ΑΘΗΝΑΙΟΣ ΕΠΟΙΕΙ (Glycon, the Athenian, made it) is engraved on the rock which supported the statue. Consult Brunn, *Geschichte der griechischen Künstler* (Brunswick, 1853), and E. A. Gardner, *A Handbook of Greek Sculpture* (London, 1911).

**GLY'COSU'RIA** (Neo-Lat., from Gk. *γλυκός*, *glykys*, sweet + *οὐρον*, *ouron*, urine). A symptom of diabetes mellitus. See DIABETES.

**GLY'KAS**, MICHAEL. A Byzantine historian. Little is known of his life. His *History of the World*, from the earliest times to 1118, is a valuable work of reference and contains many interesting references to theological and other matters. The best edition of the work was published by Bekker (Bonn collection, 1838). Glykas is said to have been imprisoned and blinded about the middle of the twelfth century. A poem, containing nearly 600 verses, addressed to the Emperor Manuel Comnenus, is valuable as one of the earliest examples of vulgar Greek.

**GLYN, ELINOR** (?- ). An English novelist, daughter of Douglas Sutherland, of Toronto, Ontario. In 1892 she married Clayton Glyn, of Harlow, Essex. She made Paris her residence. Among her published books are: *The Visits of Elizabeth* (1900); *The Reflections of Ambrosine* (1902); *The Damsel and the Sage* (1903); *Vicissitudes of Evangeline* (1905); *Beyond the Rocks* (1906); *Three Weeks* (1907), a great success because of its almost scandalous audacity; *The Sayings of Grandmama* (1908); *Elizabeth Visits America* (1909), with the author's impressions of the United States; *His Hour* (1910); *The Point of View* (1913; called *The Contrast* in England); *The Sequence* (1913); *Your Affectionate Godmother* (1914).

**GLYNN, JOHN** (1722-79). An English politician and lawyer. He studied at Exeter College, Oxford, but got no degree. Called to the bar in 1748, he soon became famous for his wide knowledge of law and for his radical position in politics. He was the valuable friend and adviser of John Wilkes, and acted for him in many cases. Wilkes said of Glynn, "He was a Wilkite, which I never was." In 1772 he was counsel for an alderman named Townsend in a suit against a land tax, in which he urged the nullity of Parliament on the ground of irregular elections. In 1768 he was elected to Parliament after an exciting campaign, marked by much violence and corruption; in the next year he presented the Middlesex petition, and in 1770 urged a committee to inquire into cases in regard to the press.

**GLYNN, MARTIN H.** (1871- ). An American public official, born at Kinderhook, N. Y. He graduated from St. John's College, Fordham, in 1894, and in the following year became managing editor of the *Albany Times-Union*. He served in the 56th Congress (1899-1901), and was comptroller of New York State (1906-08). He was elected Lieutenant Governor in 1912, and on Aug. 14, 1913, became acting Governor, although William Sulzer (q.v.) still continued in the duties of that office; but after Sulzer was removed by the Court of Impeachment Glynn assumed full control, Oct. 18, 1913. He received the degree of LL.D. from Syracuse University in 1914. After he became Governor, Glynn frequently reiterated his early statement that he was independent of Tammany Hall, and he claimed to have effected great economies in the State government. In 1914 he was successful in the direct primaries, winning the Democratic gubernatorial nomination in a contest with John A. Hennessy (q.v.). Though supported by both Tammany and the Wilson administration, Glynn was defeated, in a Republican landslide, by Charles S. Whitman.

**GLYNNE, SIR JOHN** (1603-66). An English jurist and Parliamentarian. He was born at Glynllifon, Carnarvonshire, and was educated at Westminster School and Oxford. Called to the bar in 1628, by 1639 he was a leading member of the famous Long Parliament and shared in the impeachment of Strafford. He was recorder of the city of London for six years (1643-49) and retired on an annual pension of £300. Though a stout adherent of Cromwell and a most able prosecutor of his would-be assassins, Glynne was no Republican and urged the Protector to call himself King. After the Restoration he devoted his great abilities as judge and advocate to the service of Charles II, bringing to trial some of his former associates. But he was no ordinary turncoat, though he so figures in Pepys's *Diary* and in *Hudibras*, and he remained true throughout to the Presbyterian party.

**GLYOXYLIC ACID**,  $\text{CHO} \cdot \text{COOH}$ . A compound of carbon, hydrogen, and oxygen, found in various fruits, including unripe apples, currants, grapes, and gooseberries. Chemically it is closely related to glycollic acid (q.v.) and is at once an aldehyde and an acid. In its salts, however, its aldehyde group is changed by hydration to the usually unstable group  $\text{CH}(\text{OH})_2$ . Crystalline glycollic acid, too, has been shown to have the formula  $\text{CH}(\text{OH})_2\text{COOH}$ .

**GLYPTICS**. The art of engraving, particularly as applied to the carving of precious stones. It is now generally performed by means of diamond dust and diamond-pointed instruments. In addition to gems the engraving of various substances, such as coral and ivory, and unusually hard woods, such as box and ebony, is included under this head. See **ENGRAVING**; **GEMS**; **INTAGLIO**.

**GLYPTODON** (Neo-Lat., from Gk. *γλυπτός*, *glyptos*, carved + *ὀδός*, *odos*, tooth, in allusion to the sculptured grinding surface of the teeth). A gigantic extinct edentate mammal allied to the armadillo, and of which fossil remains are found in the Pleistocene deposits of South America and less commonly in Mexico, Texas, and Florida. The animal had a solid carapace made up of mostly hexagonal plates arranged in transverse rows, like those of the armadillo, but solidly united, so that the creature was

unable to curl up. These bony plates were often ornamented by grooves or tubercles and were covered by horny epidermal scales. The tail also was incased in a sheath of strongly nodular bony plates. The head likewise had, in some species, a coat of mail of small plates. The skull is high, narrow, and short, with a peculiar long process descending from the zygomatic arch. Both the jaws have eight molar teeth on each side, each of which is divided into three vertical prisms by two deep lateral grooves, and the form of the crown sculpturing is very peculiar. The legs are heavily built, the feet large, and the fingers are short and armed with thick hooflike claws. The latter character shows that the animal could not have been a burrower like the armadillo. The best-known species is *Glyptodon clavipes* of the Pleistocene beds of Argentina, which attained a length over all of about 17 feet. An allied genus is *Dadacurus*, of even larger size than *Glyptodon*, with a smooth carapace pierced by many cavities, and a longer tail formed of five or perhaps six movable rings, terminated by a club-shaped tube, which seems to have borne movable spines or bosses at its extremity.

Consult: Huxley, "On the Osteology of the Genus *Glyptodon*," *Collected Memoirs*, iii (London, 1898); Lydekker, "The Extinct Edentates of Argentina," in *Anales de Museo de la Plata, Paleontologia Argentina*, vol. iii, part ii (La Plata, 1894); Scott, *A History of Land Mammals in the Western Hemisphere* (New York, 1913). See **EDENTATA**.

**GLYP'TOTHE'CA**, or **GLYPTOTHEK'** (Ger., from Gk. *γλυπτός*, *glyptos*, carved + *θήκη*, *thêkê*, chest). A building or room for the preservation of sculpture. Such buildings were common in ancient times. Cicero gives a minute description of one. The most famous modern gallery of sculpture called by this name is the Glyptothek in Munich (q.v.); another is the Ny-Karlsberg Glyptothek in Copenhagen.

**GMELIN**, gmä'lën, **CHRISTIAN GOTTLÖB** (1792-1860). A German chemist, born in Tübingen, and for many years professor of chemistry and pharmacy in the university of his native city. His discovery of the artificial preparation of ultramarine was highly important in its bearing on manufacturing industry. His principal work is entitled *Einleitung in die Chemie* (1833-37).

**GMELIN**, JOHANN GEORG (1709-55). A German botanist. He was born in Tübingen, was educated in the university there, and in 1731 became professor of chemistry and natural history at St. Petersburg. In 1733, by order of the Empress Anne, he joined Deslisle, G. F. Müller, and Bering in an expedition for the exploration of Siberia, which country they penetrated as far as the Lena. He returned to St. Petersburg in 1743. In 1749 he was chosen professor of botany and chemistry at Tübingen. He published *Flora Sibirica* (1747-69) and *Reise durch Sibirien* (1751-52). Linnaeus named a genus of plants *Gmelina* in his honor.

**GMELIN**, LEOPOLD (1798-1853). A German chemist. For several generations members of the Gmelin family have distinguished themselves in science. Leopold's father, Johann Friedrich, held professorships of natural history and medicine at Tübingen and Göttingen. Leopold was professor of medicine and chemistry at Heidelberg from 1817 to 1851. In 1820 he undertook, in conjunction with Tiedemann,

a series of experiments on digestion, and in 1826 they published their celebrated work on the subject, in two volumes, under the title *Die Verdauung*. Gmelin is famous chiefly, however, for his admirable and elaborate *Handbook of Chemistry* (1817-19), which was subsequently revised and enlarged by Kraut; Gmelin-Kraut's *Handbuch* is well known to every student of chemistry. An English translation of the work (under the auspices of the Cavendish Society), with important additions by Watts, the translator, was published in the course of 1848-59. Consult obituary in the *Journal of the Chemical Society* (London, 1855).

**GMELIN, SAMUEL GOTTLIEB** (1743-74). A German botanist and traveler, nephew of J. G. Gmelin. He was born in Tübingen, graduated there in 1763, went to St. Petersburg in 1767, and in 1768, with Gildenstadt and Lapuchin, entered on a journey for the scientific exploration of the southeastern possessions of Russia. When on his way back to St. Petersburg, he was seized as a hostage by Usmei Khan, of the Kaitak tribe, and died from the results of his ill treatment. He published: *Historia Fucorum* (1768); *Reisen durch Russland* (1771-84); and other works.

**GMELINA**, mēl'i-nā or nē-lī'na (Neo-Lat., named in honor of the German traveler J. G. Gmelin, 1709-55). A genus of trees of the family Verbenaceae, with heart-shaped leaves and panicles of flowers consisting of a small four or five toothed calyx and a large obliquely bell-shaped corolla. *Gmelina arborea*, called goombar or koombar in Hindustan and the Eastern Peninsula, where it is widely distributed and attains a great size, is valuable for its timber, which resembles teak, but is closer in grain and lighter. It is used for many purposes, such as foundations for buildings, decks of boats, Venetian blinds, picture frames, etc. It bears exposure to water better than do most kinds of timber. This tree has been successfully grown in the south of Florida and in California. In Australia there are two species that yield important timber—*Gmelina macrophylla* and *Gmelina leichhardtii*. The latter attains a height of 120 feet, with a diameter of 4 feet, and is one of the most valuable timbers of the country, where it is known as beech or white beech, although it is in no way related to the white beeches of Europe and America. The sapwood of the former species is mottled, heavy, close-grained, and valuable.

**GMÜND**, gmünt'. A town of the German Kingdom of Württemberg, situated in the beautiful valley of the Rems, about 32 miles southeast of Stuttgart (Map: Germany, C 4). It was formerly an Imperial city, and its walls and towers still remain. The most noteworthy churches are the Romanesque church of St. John and the fourteenth-century church of the Holy Cross, with a sculptured portal and a carved altar. The thirteenth-century Dominican monastery of Gotteszell is now used as a prison, and the church of St. Salvator, hewn in a cliff outside the town, is visited by many pilgrims. Gmünd has a Gymnasium, a trade school in working the precious metals, and a Catholic teachers' seminary. The manufactures are wooden and iron articles, bronzes, cigars, chronometers, wax goods, flour; but the chief industry is making jewelry and other gold and silver goods. Gmünd, first mentioned in the

eleventh century, became an Imperial free city in the thirteenth century and retained its independence until 1803. It is the birthplace of Heinrich von Gmünd, one of the architects of the Milan Cathedral. Pop., 1900, 18,699; 1910, 21,270.

**GMÜND, VON.** A German family of stone cutters. For the more important members, see PARLER, PETER.

**GMUNDEN**, gmün'den. A favorite summer resort and watering place of Upper Austria, charmingly situated at the north end of Lake Traun, 1395 feet above sea level, about 50 miles northeast of Salzburg (Map: Austria, C 3). It has a seventeenth-century Catholic church with a fine carved wood altar, a new sanatorium, a Gymnasium, and a brewery. It is well built and lighted by electricity, and has beautiful promenades and many handsome villas in the environs, which offer many chances for excursions. Pop., 1900, 7126; 1910, 6699.

**GNAT**, nāt (AS. *gnat*). A name applied to several kinds of small flies and in England to mosquitoes. Having been replaced by "mosquito," the word is becoming obsolete in North America. The commonest form to which it is still applied are the fungus gnats (*Mycetophilidae*) and the gall gnats of the family Cecidomyiidae. The fungus gnats are mosquito-like, but are easily recognized by the great length of the coxal (or uppermost) joint of the leg. They are found in great numbers on fungi and around decaying vegetable matter found in damp places. They can leap actively as well as fly. The gregarious larvae live in such vegetable matter. In some species the larvae before pupating will form a marching army in which the individuals are four to six deep. The gnats of the dipterous genus *Sciara* frequently swarm in houses during summer evenings. The gall gnats have the body and wings covered with long hairs, that are easily lost. The larvae are small maggots, often bright-colored, and live in plants, in which they form galls. The Hessian fly that infests wheat belongs here, and also the resin gnat that infests pine. See FUNGUS GNAT; GALL GNAT; MOSQUITO; BLACK FLY.

**GNAT CATCHER.** A small insectivorous bird, related to the Old World warblers, and peculiar to America, especially to Central and South America. About 15 species are known, of which three reach the United States. The coloration is bluish ash, paler below; tail black and white. They are said to be good singers. The commonest species is the blue-gray gnat catcher (*Poliophtila caerulea caerulea*), which is found in the southeastern United States, in summer breeding as far north as southern Pennsylvania and New Jersey, from the Atlantic to the Pacific. It breeds throughout its range, making a singularly beautiful nest in the form of a tiny cup, set upon the upper side of a lofty tree limb, and coated with lichens until it simulates a mossy excrescence. A western subspecies occurs on the Pacific coast and two other species are found in the southwestern United States, near the Mexican border.

**GNATHO**, nā'thō. A sycophant in Terence's *Eunuchus*, and in later comedy the typical name for a parasite.

**GNATHOBDELLIDA**, nāth'ōb-dēl'i-dā (Neo-Lat. nom. pl., from Gk. *γνάθος*, *gnathos*, jaw + *βδέλλα*, *bdella*, leech). The order of worms of the class Hirudinea which includes those leeches

that have no proboscis, as the common parasite leech, the horseleech, the land leech, and related forms. See LEECH.

**GNATIA**, nā'shī-ā, or **EGNATIA**, ěg-nā'shī-ā. An ancient town in southern Italy, on the Adriatic Sea, 38 miles southeast of Barium (see BARI), mentioned by Horace, *Satires*, i, v, 97, in his account of his journey from Rome to Brundisium, as lacking in good water, and as the seat of a supposed fire miracle (consult Pliny, *Historia Naturalis*, ii, 107, 240). In Roman times the town had a lively trade because of its position on the sea and at the junction of important roads. The ancient city, which some locate near Monopoli, others at Torre d' Anazzo, near Fasano, has disappeared, but important finds have been made in its tombs; these are to be seen in the museum at Bari. Consult the article "Gnathia," in Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

**GNATSNAPPER**. A name given to certain Old World birds that seize insects on the wing, often with an audible snap of the beak, such as the bee eater (q.v.).

**GNAUTH**, gnout, ADOLF (1840-84). A German architect, born in Stuttgart, where he was educated at the Polytechnic Institute. In 1861-63 he studied in Italy, whither, after a stay in Vienna, he went again, in 1864, to collaborate with Emil von Förster in making the designs for Raschdorff's *Palastarchitektur von Oberitalien und Toscana* (Berlin, 1883). He was once more in Italy during the summer months of 1867-69, painting large-sized water colors of the monuments of the Renaissance for the Arundel Society in London. Appointed professor at the Polytechnicum in Stuttgart in 1870, he resigned in 1872, in order to execute orders for the erection of a number of private buildings. He visited Greece and Egypt in 1875, Spain and southern France in 1882, and became director of the Industrial Art School at Nuremberg in 1877. An adherent of the late Renaissance style, he adapted in an original manner the palatial architecture of Italian cities to his structures.

**GNEDITCH**, gnā'dich, NICOLAI IVANOVITCH (1784-1833). A Russian poet. He was born at Poltava and was educated at the University of Moscow. He went to St. Petersburg at the age of 19 and was employed there in the Ministry of Education and in the Imperial Public Library. He devoted especial attention to translation of the classical poets of Europe, his best work in that field being the Russian version of the *Iliad* (latest ed., 1880). The work was begun in 1809 and completed in 1829 and is a masterpiece of versification. He wrote several original poems of high merit and translated into Russian some works of Shakespeare, Voltaire, Schiller, and other European poets.

**GNEISENAU**, gni'ze-nou, AUGUST WILHELM ANTON, COUNT NEITHARDT VON (1760-1831). A Prussian field marshal and one of the most prominent figures in the War of Liberation. He was born at Schildau in Prussian Saxony, Oct. 27, 1760. In 1777 he entered the University of Erfurt and two years later joined an Austrian regiment. In the following year he entered the service of the Margrave of Ansbach-Bayreuth and in 1782 went to America as an officer in the mercenary force raised by Great Britain in Germany. He returned, however, in the following year without having seen any actual fighting. In 1786 he entered the Prussian service as lieutenant of infantry. The next 20 years, with

the exception of a year's active service in Poland in 1793-94, were spent in the quiet of garrison life. During this time, however, Gneisenau became a profound student of military and political history. In 1806 he took the field against Napoleon and fought at Saalfeld and Jena. He was raised to the rank of major and was intrusted, in April, 1807, with the defense of Kolberg, which was invested by a large French army. With the aid of Schill and Nettelbeck he carried on a heroic resistance against the greatly superior forces of the French until hostilities were concluded by the Peace of Tilsit. For his services he was raised to the post of chief of engineers, received the Prussian order "pour le mérite," and was made a member of the council to which was intrusted the task of reorganizing the Prussian state, which had exhausted its forces in the disastrous war against Napoleon and had been dismembered by the Peace of Tilsit. In this work of national revival he cooperated heartily with Stein and Scharnhorst, and though primarily devoted to the problem of military reorganization, exercised considerable influence on the general policy of the ministry. After Stein's dismissal he resigned (1809), owing to the hostility of Napoleon, and from 1811 to 1813 was intrusted with secret missions to Austria, Sweden, Russia, and England. Upon the outbreak of the War of Liberation in 1813, he became a general in the corps of Blücher and subsequently chief of staff to the army of Silesia. In this position Gneisenau displayed remarkable strategic talents, a relentless energy, and a daring which contributed in no small degree to the success of the Prussian arms. He became lieutenant general after the battle of Leipzig and upon the return of Napoleon from Elba was made once more chief of staff under his old commander, Blücher. After the repulse of the Prussians at Ligny, June 16, 1815, he executed a skillful retreat, and to him was due, in large measure, the opportune arrival of the Prussians on the battlefield of Waterloo (June 18). After the decision of the battle he led the pursuit, turning the French retreat into a complete rout. He was made Governor of Berlin in 1818 and field marshal in 1825. Soon after the outbreak of the Polish insurrection of 1830 he was assigned to the command of the Prussian corps on the Polish frontier, but he died at Posen, Aug. 24, 1831. Gneisenau has assumed in Prussian history the dimensions almost of a national hero. He was with Stein, Scharnhorst, and York, one of the small band of patriots who in the hour of Prussia's deepest degradation never despaired of their country, and later, when an opportunity offered for overthrowing Napoleon, devoted themselves to the destruction of the hateful French domination. In Gneisenau, moreover, ardent patriotism was combined with a most lovable nature, marked by natural gentleness and refined by years of study and by travel. There is a monumental life of Gneisenau, *Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau*, in five volumes, by Pertz and Delbrück (Berlin, 1864-80); a shorter biography, *Das Leben des Feldmarschalls Grafen Neithardt von Gneisenau*, was published by Delbrück in two volumes (2d ed., ib., 1907). Consult also Neff, *Die Heldenlaufbahn des Generals der Infanterie August von Gneisenau* (ib., 1889), and Pick, *Aus der Zeit der Not, 1806 bis 1815* (ib., 1900).

**GNEISS**, nls (Ger., probably connected with OHG. *gneista*, Icel. *gneisti*, AS. *gnāst*, Eng. *gnast*, spark). A family of rocks belonging to the metamorphic series and resembling granite in composition. Gneisses are granular aggregates of feldspar and quartz, with mica, hornblende, or pyroxene, and some of the rarer metals. Their structure is characterized by a parallel arrangement of the constituents; the light and dark minerals alternate in bands or layers, which are sometimes so regular and distinct as to give the appearance of stratification. Owing to this peculiarity, many geologists hold that they are metamorphosed sediments. There is conclusive evidence, however, that the parallel arrangement may be brought about in rocks of truly igneous origin, either as a result of movements of the constituents while the magma is in process of solidification, or by compression and shearing strains after the rock mass has solidified. Some gneisses, doubtless, have resulted from the metamorphism of sediments; but in such cases the proof is not based primarily upon the gneissoid character. Neither the igneous nor the sedimentary theory of origin is to be accepted for gneisses as a class, and each occurrence must be studied by itself. For this reason geologists have come to use the term "gneiss" in its structural sense, without implying anything further as to origin or constituent minerals. When it is desired to define the composition of a particular type, other rock names are united with the term; e.g., granitic gneiss, syenitic gneiss, gabbro gneiss, or granitic gneiss, syenitic gneiss, gabbroic gneiss. Gneisses are the most widely distributed of metamorphic rocks (q.v.) and are found underlying the earliest sediments in almost all parts of the world. They are important quarry materials, and many of the so-called granites that are employed for structural stones are really gneisses, as indicated by their foliated textures. Consult Kemp, *Handbook of Rocks* (New York, 1900), and Pirsson, *Rocks and Rock Minerals* (ib., 1911). See GEOLOGY.

**GNEIST**, gníst, RUDOLF VON (1816-95). A German jurist and statesman, born in Berlin, Aug. 13, 1816. He was graduated from the University of Berlin and while occupying the post of lecturer in the university practiced the profession of law. From 1841 to 1844 he traveled through Italy, France, and England, making a comparative study of the law system of these countries. In 1844 he became professor extraordinary of jurisprudence, and in 1850 he resigned his position as assistant judge of the Superior Court to devote himself more exclusively to teaching and especially to further the interests of the National Liberal party. In 1858 he became a member of the Lower Prussian House, where he served till 1893. He was prominent as a Liberal in that body and in the Reichstag, of which he was a member from 1867 to 1884. Gneist was an active member of the Liberal opposition, and subsequently of the National Liberal party, among whom his profound scholarship made him an intellectual leader. Several of his ablest works relate to the English constitution, which he greatly admired, and which he studied and cited as a model in the discussion of German affairs. In 1888 Frederick III raised him to the nobility. His first notable work was *Geschichte und heutige Gestalt der Aemter in England* (1857). Other important works of special interest to English students and

appearing in English translations are *Englische Verfassungsgeschichte* (1882), which is perhaps his greatest single piece of work, and *Das Englische Parlament* (1886). He also wrote *Der Rechtsstaat* (1872) and numerous other works on the history of jurisprudence and legislation. Consult Gierke, *Rudolf von Gneist* (Berlin, 1895).

**GNESEN**, gná'zen (Pol. *Gniezno*). A town in the Province of Posen, Prussia, capital of a district of the same name, situated between hills and lakes, 31 miles east-northeast of Posen (Map: Germany, G 2). Its old and noteworthy cathedral, begun in the tenth century, is adorned with fine paintings, bronze doors, and chapels, and contains the tomb of St. Adalbert, who was Bishop here, and first preacher of the gospel in Prussia. There are also an archiepiscopal palace, a theological seminary, a college, a gymnasium, and a monument to Emperor Frederick III. The manufactures include machinery, lumber, leather, dairy products, sugar, and flour. It has a large trade in cattle, horses, and grain. Tradition fixes the year 550 as the date of the foundation of Gnesen, one of the oldest towns in Poland. It became an archiepiscopal seat in 1000 and during the Middle Ages was for a time the residence of the Polish kings, who were crowned here until 1320. The archbishops of Gnesen were primates of the realm and acted as vicars during the frequent interregnums. Pop., 1900, 21,693; 1910, 25,339, including many Poles.

**GNETALES**, né-tá'lez (Neo-Lat. nom. pl., from *Gnetum*, from Malay *gnemon*, the native name). One of the great groups of gymnosperms, which comprises at present three genera, that differ remarkably in habit and habitat. The genera are *Ephedra*, with about 30 species, from the arid regions of both hemispheres; the very peculiar *Welwitschia*, from certain extremely arid regions of western South Africa; and *Gnetum*, with about 15 species, from the tropics of both hemispheres. The species of *Ephedra* are low, straggling shrubs, with long-jointed and fluted green stems, and opposite, scalelike leaves connate into a two-toothed sheath. The body of *Welwitschia* has the shape of a gigantic radish, which rises little above the surface of the ground, and whose crown is sometimes 12 to 15 feet in circumference. From the edge of the crown two enormously long, parallel-veined leaves arise, which extend upon the ground sometimes for 10 to 15 feet, and become split into numerous ribbons. This single pair of opposite leaves, the only pair produced, grows continually at the base and lasts through the lifetime of the plant, which is said to reach more than 100 years. The species of *Gnetum* are either small trees or woody climbers and are among the prominent lianas of tropical forests. The foliage is leathery in texture and suggests dicotyledons, as the well-developed opposite leaves are lanceolate to ovate in outline and pinnately net-veined. See Plate of GYMNOSPERMS.

The group is of special interest to the botanist on account of the display of certain angiospermous characters that have suggested that Gnetales may have given rise to the angiosperms. The characters that distinguish the group from other gymnosperms are the occurrence of true vessels in the secondary wood and the presence of a so-called perianth. In addition to these two distinguishing characters, the group has the following four characters in common, but not peculiar to it: (1) opposite leaves, (2) dicoty-



ledonous embryos, (3) cauline ovules, and (4) no resin ducts. Some fossil forms have been found in the later deposits that suggest Gnetales in appearance, especially *Ephedra*, but such evidence is not trustworthy. At present Gnetales are unknown as fossils, but they give evidence of an extended history. Their great dissimilarity in habit, structure, and habitat, associated with their widely scattered distribution, indicate a relatively large group of ancestors of somewhat general distribution.

**GNOLI**, nyô'le, DOMENICO (1839- ). An Italian author, born in Rome. He attracted public attention by his volume of poems published under the pseudonym of "Dario Gaddi," and a collection of critical essays, *Odi tiberine*, classic in style. He was professor of Italian literature at Turin and in 1893 was made prefect of the Library Vittorio Emanuele at Rome. He collaborated on the *Nuova Antologia* and founded and was a director of the *Archivio Storico dell' Arte*. Besides translations of the *Römische Elegien* of Goethe and various other German classics, he published several volumes of verse under the name "Giulio Orsini." Many of his original essays were published in the *Nuova Antologia*. His other writings are: *Il morto il re* (1882); *Canto dei pellegrini alla tomba del gran re* (1883); *Le opere di Donatello in Roma*; *Il banco d' Agostino Chigi*; *Jacovello*, poems (1905), showing an entirely new manner of exquisite sentimentality as opposed to the sculptural intellectuality of his earlier work. His critical studies, especially of the *Risorgimento*, are admirable. He became famous as a lecturer.

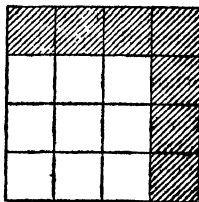
**GNOME**, nôm (Fr. *gnome*, apparently from Gk. γνώμη, *gnômê*, knowledge, or from γνώμων, *gnômon*, one who knows, from γινώσκειν, *ginôskkein*, to know). A name given in the cabalistic and mediæval mythology to one of the classes of beings which are supposed to be the presiding spirits in the operations of nature in the mineral and vegetable world. They have their dwelling within the earth, where they preside specially over its treasures, and are of both sexes, male and female. (See INCUBUS; KOBOLD.) The males are often represented in the form of misshapen dwarfs. They are supposed to be the special guardians of mines and miners. In later times the word has been loosely used as the equivalent of "elf" or "fairy."

**GNOME** (Gk. γνώμη, knowledge, judgment, maxim). A short and pithy proverbial saying, often embodying a moral precept. Such sayings have been common among nearly all nations at some period of their development; examples are plentiful in the Bible. In Greece the period when men began to express in a proverbial form general maxims of conduct was the age of the Seven Wise Men. The gnomic form of expression became also a characteristic of much of the lyric poetry of the period, and such poetry as had this characteristic was called at a later time *gnomic* (γνομικός). Lyric poets in whose verse this gnomic character prevailed or was prominent are Solon, Theognis, Phocylides, Simonides of Amorgus, and Xenophanes; of these Theognis is the most important, since his gnomic writings are well preserved. In gnomic poetry the source of moral philosophy has been found. The Romans had a great fondness for short and pithy sayings, which they called *sententiae*. Such *sententiae* characterize all Latin writing, but especially the writers of the late Augustan age

and of the first century A.D., e.g., Publilius Syrus, Lucan, and Juvenal. There are editions of the gnomic poets by Brunn (Strassburg, 1817), Schäfer (Leipzig, 1817), and Bergk, *Poetæ Lyrici Græci*, vol. ii (4th ed., ib., 1882). Consult also: Opsimathes, *Γνώμαι; sive Thesaurus Sententiarum et Apophthegmatum* (ib., 1884); Haskins and Heitland, ed. of Lucan, pp. lxx-lxix (London, 1887); Wright, *A Short History of Greek Literature*, 81 ff. (New York, 1907); Murray, *A History of Ancient Greek Literature*, 84 ff. (ib., 1897).

**GNOME OWL**. A name given both to the burrowing owl (q.v.) and to the pygmy owl (q.v.) of the western United States.

**GNOMON**, nô'môn (Gk. γνώμων, one who knows). The name given to odd numbers by Pythagoras. An odd number of the form  $2n + 1$  was known to be the difference of two square numbers  $(n + 1)^2$  and  $n^2$ . This doubtless arose from the geometric conception of a gnomon as the difference between two squares or rectangles; e.g., take a square of side 3 (see figure) and extend its length and breadth one unit. The resulting figure is a square of area 16. The difference of these squares,  $16 - 9$ , or 7, represents an odd number, or gnomon.



The term "gnomon" was also applied to a kind of sundial (consisting of a staff through the centre of three concentric circles), used not only for measuring time during the day, but also for ascertaining the periods between the solstices and for finding altitudes of the sun and stars. As a scientific instrument, it is said to have been introduced into Greece by Anaximander (610-546 B.C.).

**GNOSTICISM**, nôs'ti-siz'm (from *gnostic*, from Lat. *gnosticus*, Gk. γνωστικός, *gnôstikos*, relating to knowledge, from γινώσκω, *ginôskō*, knowable, from γινώσκειν, *ginôskkein*, to know). The name given to related systems representing a wide movement which flourished in the Church of the second century. Like much of the philosophy of that time, the Gnostic systems were syncretistic, drawing their materials from Jewish, Christian, and pagan (Oriental) sources. They were cosmological rather than theological in character, their aim being to describe how the cosmic order was originally projected, then lost, and finally restored.

Gnosticism arose outside the Church, but soon entered it. Even before the close of the New Testament we find warnings against a "false" knowledge (1 Tim. vi. 20), which doubtless refers to some kind of Gnostic speculation already judged to be dangerous to the faith. The letter to the Colossians combats ideas which show elements of Gnosticism. Nevertheless, Gnostic ideas were long current within the Church, and often during the early period they were maintained without offense. Ignatius of Antioch, at the beginning of the second century, uses Gnostic language in speaking of Christ as the Logos of God, "who proceeded from silence." (*Ep. to Magnesians*, 8.) And in 2 Clement, 14, we meet again with Gnostic terms, where the preacher says: "I do not suppose ye are ignorant that the living Church is the body of Christ, for the Scripture saith God made man male and female. The male is Christ, and the female is the Church." In other words, the Christian



Gnostics were Christian theologians, though the system had already developed from Oriental mythologies before it came into contact with Christianity. Their leaders were persistent in maintaining that they drew their inspiration and authority from apostolic sources. So Valentinus traced his connection with Paul through one Theudas; Basilides with St. Peter through Glaukias. (Clement of Alexandria, *Stromata*, vii, 17.) We learn from Epiphanius that Ptolemy declared he had the authority of "apostolic tradition" for what he taught. In this respect the Gnostics pursued the same course as the ancient Catholic church. But when Irenæus wrote his great work, *Against Heresies* (180-190 A.D.), the Church had already begun to distinguish between "ordinary" (i.e., orthodox) Christians and Gnostics, whom Irenæus calls "heretics." We may therefore infer that about this time the exclusion of Gnostics from Church fellowship was beginning. After the close of the second century, whenever the claims of "knowledge" are freely advanced and maintained by prominent writers (as, e.g., by Clement of Alexandria and Origen), it is a permissible Christian Gnosticism which they are describing and defending, not the Gnostic heresy which the Church had by that time rejected. To Clement the Christian is the only true Gnostic. (*Stromata*, vii, *passim*.)

Most of the Gnostic literature has perished, though several extensive treatises from Coptic represent a late form of the movement, and we are forced to rely upon its orthodox opponents for most of our information concerning the heresy. Our most important witnesses are Irenæus, Tertullian, Hippolytus, and Epiphanius; but light is also cast upon its early forms by Ignatius and Justin Martyr. Gnostics were numerous after the end of the first century and found in widely separated localities. (For the names of the leaders and sects, see Gnostics.) Their teachers differed from one another in details and in some important doctrines; nevertheless, a remark made by Hippolytus in his account of the serpent worshippers (*Refutatio*, v, 1) might be applied to all Gnostics alike: "Their detached heresies are essentially one." The sects were all religions of redemption. All held some sort of dualistic theory of the world—that spirit and matter, good and evil, are essentially opposed to each other. Whatever comes in contact with matter shares in its contamination; therefore the supreme God cannot be the Creator of the world. Of the supreme God indeed hardly anything can be predicated. He (It) is wholly transcendent, utterly remote from all that we know as existing. We might even call Him (It) the "Nonexistent," as does Hippolytus. From information given mainly by Irenæus in his work *Against Heresies* we are able to construct an outline of the teaching of Valentinus, from which the place occupied by the Creating God will appear in due course. At the two extremities of thought are transcendent Deity and the Void, or Emptiness (*κένωμα*). Between them there is no connection or communication. No world exists, nor is there any creative agency to produce a world. There is a series of divine beings, or powers, called Æons (*αἰῶνες*), which emanate in pairs from the First Cause, with diminishing dignity as they proceed. These Æons together constitute the Pleroma (*πλήρωμα*), or Fullness of divine existence, as over against the Kenoma, or great Void. They are sym-

bolized as male and female; e.g., Nous (*νοῦς*, mind) and Aletheia (*ἀλήθεια*, truth); Logos (*λόγος*, word or reason) and Zoe (*ζωή*, life). The total number is 30, corresponding to the unknown and mysterious years of Christ's life, before He began His public ministry. They are arranged in groups of an Ogdoad, a Decad, and a Duodecad. One of the lowest and feeblest Æons, Sophia (*σοφία*, wisdom), rashly attempts to mount up to a union with the great First Cause, or Father of All, and thereby interrupts the order or equilibrium of the whole system, which is the Gnostic "fall." Part of Sophia sinks to the great Void and produces a son, the Creator, or Demiurge (*δημιουργός*, which suggests Plato's creating god), who proceeds to form the visible world, including man. He is the Jehovah of the Old Testament, the only God known to the Jews. He, ignorant of the Pleroma, supposes Himself to be the Supreme Being. The material creation, being more or less directly the consequence of an interrupted order, is itself by nature evil. And this evil quality, from which nothing material escapes, includes the human race. See DEMIURGE.

The problem of redemption for the Gnostics was to restore the lost cosmic order, to remedy the evil caused by the weak and erring Sophia, to liberate those sparks of Deity which had become entangled in the meshes of evil matter and in man. Christ is an instrument in the accomplishment of this task—Himself an Æon indeed, who was joined with the human Jesus of Nazareth from the time of his birth, or of his baptism to his crucifixion. This union was *docetic*, i.e., only a seeming. The heavenly Christ did not in fact suffer or die, but left the man Jesus before his death on the cross. (See DOCTÆ.) Christ's office, so far as men are concerned, was to teach the true "knowledge," to make Gnostics, to impart the secrets of that system to which He Himself belonged. The redeemed are those who can receive this esoteric teaching and become free from the flesh. Their salvation is only an incident in the vast process of restoring the lost harmony of the Pleroma. This salvation is from ignorance—a very different matter from the Christian idea of being saved from sin.

According to the ethical system of the Gnostics, all men are divided into three classes, according as they have, or have not, elements of Deity within them; spiritual or pneumatic men (*πνευματικοί*); animal or psychic men (*ψυχικοί*); and carnal or physical men (*σαρκικοί*, *σωματικοί*). The Gnostics themselves constitute the members of the first group; they will be saved through their knowledge of the esoteric system and through their ascetic life. The third group are wholly material and cannot be saved, for their nature is evil; they have no single spark of the divine within them. In the intermediate class ordinary Christians are found, persons who have not the higher knowledge, yet who may possibly—at least some of them—be saved through faith (*πίστις*), which is vastly inferior to "knowledge." In the practical relations of life the Gnostics applied their principles in one of two ways. Although these seem diametrically opposed to each other, yet each was supported by an appeal to the logic of their principle that matter is essentially evil. Some said: The body, being composed of evil matter, should be denied in its every tendency and impulse—whence resulted *asceticism*. Others said: It may be indulged in

every physical gratification and even abused through overuse—whence resulted libertinism and sensuality. All the nobler Gnostics adopted the ascetic life, and some of them pushed it to an extreme (as, e.g., the Encratites). The opposite theory of self-indulgence was advocated and practiced by such sects as the Carpocratians, the Nicolaitans, and the Cainites.

The traces of Christian teaching in this system are manifest. But not less evident is the influence of Hellenic and Oriental speculation. Harnack has coined a phrase which is already proverbial (the “acute Hellenizing of Christianity”), to describe the progress of Gnosticism. The attempt to Hellenize Christianity and explain away its doctrines in the light of the “higher knowledge” was parallel to the line which heathen philosophers had taken with popular theology, which they admitted contained some manner of truth accommodated to the ignorance of the multitude. So Gnosticism would admit the necessity of faith for the vulgar multitude, but reserved the “higher knowledge” for the few who were fitted to receive it. This knowledge was superior to and independent of the faith. The central idea of Gnosticism made it welcome to many who were half converted from heathenism. The æsthetic instinct, which was the soul of Greek and Roman culture, revolted at the authority of the Church, which imposed the same belief on all, and exacted the same submission from philosopher and slave alike. In a system of compromise like Gnosticism, it escaped this ignominy.

In the course of the Gnostic controversy the Church defined her theory of the ancient Catholic standards, as the tests of orthodoxy, viz., the rule of faith, the canon of Scripture, and the episcopate, each of these being regarded as of apostolic origin and authority. Upon them she relied not only for vindicating the truth of her doctrine and the sole validity of her practice, but also for proving the falsity of her opponents' position. With these standards once generally recognized, the Gnostics, who were in the minority, could be, and were, shut out from Christian fellowship. This development was under way long before the close of the second century and was practically complete in the age of Cyprian (c.250 A.D.), when Gnosticism had already become a negligible factor. In fact, after Marcion, in the middle of the second century, Gnosticism is of little practical importance, though its tendencies reappear in the Manichees and Manichæan sects of the Middle Ages.

**Gnostic Writings.** Basilides' 24 books on the Gospel, entitled *Æxegetica*, have for the most part perished, along with other early heretical works, but we have some quotations from them in the early Christian literature. There is at present no way of verifying Origen's statement that Basilides wrote a gospel of his own, nor have we the *Gospel of Truth*, which Irenæus attributes to the Valentinians. The *Letters*, *Homilies*, and *Psalms* of Valentinus have likewise perished. Fragments have come down to us from the works of Bardesanes, a Christian poet of Syria (died after 220 A.D.), who is sometimes classed among the Gnostics. In the *Pistis Sophia* we possess an Egyptian Gnostic writing of the third century, preserved in Coptic, relating the history of Wisdom in the form of a dialogue between the risen Christ and His disciples. Here asceticism is put forward as a

Christian duty, and we find something closely akin to the sacramental theory of penance. Other valuable Coptic versions of Gnostic works have recently been discovered by Carl Schmidt, including the *Books of Jen*, the *Gospel of Mary*, and the *Sophia Jesu Christi*. Epiphanius preserves for us a letter from the Valentinian Ptolemy to Flora, and there is also a Naassene hymn. There are several books of Gnostic Acts, bearing the names of Peter, John, Thomas, and Andrew, which appear to have been circulated in a collection which passed under the name of one Leucius.

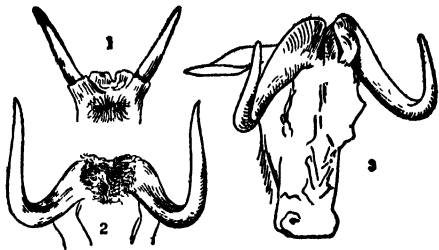
**Bibliography.** On the literature of Gnosticism, consult: Harnack-Preuschen, *Geschichte der altchristlichen Litteratur* (Leipzig, 1893); Mead, *Pistis Sophia*, translation (London, 1896); King, *The Gnostics and their Remains* (2d ed., ib., 1887); Mansel, *The Gnostic Heresies of the First and Second Centuries* (ib., 1875); Hilgenfeldt, *Ketzergeschichte des Urchristenthums* (Leipzig, 1884); Mead, *Fragments of a Faith Forgotten* (London, 1900); Swiney, *Esoteric Teachings of the Gnostics* (ib., 1909); Bousset, *Haupt probleme der Gnosis* (Göttingen, 1911); Faye, *Gnostiques et gnosticisme* (Paris, 1913); and especially C. Schmidt, *Coptic-gnosticische Schriften* (Leipzig, 1905). The most important attacks upon the Gnostics may be read, in English, in the *Ante-Nicene Fathers*, ed. by Coxe (10 vols., New York, 1885-96). In general, consult: Harnack, *History of Dogma*, vol. i (London, 1894); Rainy, *The Ancient Catholic Church* (New York, 1902); W. Schultz, *Dokumente der Gnosis* (Jena, 1910). See BASILIDES; CARPOCRATES; CERDONTIANS; CERINTHUS; DOCETÆ; ENCRATITES; HERACLIFON; MARCION; NICOLAITANS; OPHITES; SETHITES; VALENTINIANS.

**GNOSTICS**, nōs'tiks. Those who adhered to the system known as Gnosticism. From the end of the first century onward for two generations Gnostic heretics were many and widely scattered. “A multitude of Gnostics have sprung up and have shown themselves like mushrooms growing out of the ground,” says Irenæus. It was formerly customary to distinguish two main types, a Jewish and a Greek, but it is hardly possible to classify them with any exactness. Carpocrates, Saturnilus, Cerdo, Basilides, Valentinus, Isidore, Heracleon, Ptolemy, and Julius Cassianus are among the best-known Gnostic leaders. Saturnilus (or Saturninus, as he is sometimes called) represents the Syrian school, to which Tatian and the ascetic sect of the Encratites are in a measure related. Basilides and Valentinus are the masters of the Alexandrian Gnostics, the school which was by far the most important and about which we have the fullest information. Basilides taught in the time of Hadrian. Valentinus went from Alexandria to Rome, where he labored (c.140-160 A.D.) and founded a church. Marcion of Pontus (q.v.) is sometimes reckoned as a Gnostic and certainly had many points in common with them. See GNOSTICISM, and the articles on the Gnostic teachers and sects.

**GNOSUS.** See CNOSUS.

**GNU**, nū (from Hottentot, *gnu*, *nyu*), or WILDEBEEST. A member of a remarkable genus (*Connochetes*) of African antelopes, of which the best-known species has been formerly described as made up of parts of an antelope, a buffalo, and a horse. The grotesque appearance of some species suggests this composite. (See Plate of

**ANTELOPES.)** The gnus form a genus of large, ungainly animals, having horns in both sexes and the withers higher than the haunches. The body and legs are antelope-like, but the head is so massive and broad as to resemble that of an ox. The muzzle is naked, the eyes are small, with a gland beneath each, whence sprout long



HORNS OF GNU.

Showing development from the yearling (1) through youth (2) to maturity (3) in the white-tailed gnu.

stiff hairs, and the horns, which in old age form a helmet over the forehead, are broad, black, and shaped like an African buffalo's, to which must be added the bovine-like circumstance, not present elsewhere among antelopes, that the horn cores are honeycombed with cavities. Long hairs bristle about the chin and throat, and a stiff mane is borne upon the arched crest of the neck; while the tail is profusely hairy, like that of a horse, and sweeps the ground.

There are two species. The once "common" gnu, or white-tailed wildebeest (*Connochetes gnu*), formerly roamed all over South Africa, but by the end of the nineteenth century had become so scarce as to be extinct except in the remoter districts; its dependence upon water denied it the desert, which has been the means of preserving some of its former associates. In this species long hair fringes the chest, and the color is uniformly deep brown, with the tail white. In the other species, the brindled gnu or blue wildebeest (*Connochetes taurinus*), whose habitat was north of the Zambezi, wherever plains extended, the chest has no long hair, the tail is black, and the general color duller, and marked with dark vertical stripes upon the shoulders and neck. The former stands about 4½ feet high; the latter is somewhat larger. The females of both are lighter in hue than the males.

Gnus went about in bands of 30 or 40 and were fond of associating with quaggas and zebras, whose actions their own resembled. The old bulls were extremely watchful and usually the first to discover danger and give the alarm. Consult Lydekker, *Game Animals of Africa* (London, 1908). See ANTELOPE, and Plate of ANTELOPES.

**GNU GOAT.** See TAKIN.

**GOA, gō'ā.** A Portuguese colony on the Malabar coast, India, extending from lat. 14° 53' to 15° 48' N. and from long. 73° 45' to 74° 24' E. (Map: India, B 6). It is 60 miles long by 30 miles broad and contains an area of 1301 square miles. It has been a Portuguese possession since its conquest by Albuquerque in 1510. Pop., 1900, 475,513. Capital, Panjim, or New Goa. (See following article.)

**GOA.** A city on the Malabar coast, India, in lat. 15° 30' N. and long. 73° 57' E., the former capital of the Portuguese dominions in India (Map: India, B 6). It was once a city of great

magnificence, with 200,000 inhabitants, and important chiefly on account of its harbor, one of the best on the west coast. Its decline was due to the ravages of cholera in the beginning of the eighteenth century, when most of the Portuguese left the former site and settled nearer the harbor of Panjim, or New Goa, which is the present seat of the colony. Pop., 1900 (old town), 2302; (new town), 9325. The old city is the see of an archbishop, the head of Roman Catholicism in India, and contains the imposing cathedral of St. Catharine, built in 1623, and the church of Boni Jesus, besides many interesting ruins. Panjim, on the Mandavi River and connected by the Portuguese West India Railway with British India, is a clean and picturesque town, with a good modern harbor, large barracks, viceregal palace, college, and public library. It has large salt works near by. Rice, coconuts, and spices constitute the chief products and exports. For a description of ancient Goa, consult: Marryat, *Phantom Ship* (London, 1839); B. H. Baden-Powell, *The Villages of Goa in the Early Sixteenth Century* (ib., 1900); Henry Bruce, *Letters from Malabar and on the Way* (New York, 1909).

**GOA.** A gazelle (*Gazella pecticaudata*), inhabiting the highest pastures of the Tibetan plateau, and having a very heavy coat of hair in adaptation to its cold habitat.

**GOA CEDAR.** See CYPRESS.

**GOAJIRA, gō'ā-he'rá.** A peninsula of South America, lying west of the Gulf of Venezuela, forming the most northern part of the continent. Its area is estimated at over 5000 square miles (Map: Colombia, C 1). The coasts are mostly sandy and low, while the interior contains a number of mountains. It is sparsely watered, and the chief occupation of the inhabitants is cattle breeding. Its people are semi-independent Indians, known under the name of Goajiros, and variously estimated at from 30,000 to twice that number. The peninsula was formerly divided between Venezuela and Colombia, but by the decision of 1891 it was awarded to the latter.

**GOAJIROS, gō'ā-he'rós.** An Arawakan tribe of the Goajira Peninsula, on the northwest of Lake Maracaibo, South America. This most interesting tribe build their houses in the Maracaibo and other lagoons of Venezuela, driving piles into the mud, and erecting on them oblong rectangular dwellings with high-pitched roofs. The structures are thatched and have on one or more sides platforms on which cooking and the family occupations are carried on in open air, and which also serve as landing places for canoes. The name "Venezuela," or "little Venice," originated from the prevalence of these structures over the water. The people subsist by fishing, agriculture, and on the natural fruits, nuts, and roots of this bountiful region. They are expert in weaving cotton and palm textiles and make beautiful featherwork. Consult I. F. Holton, *New Granada: Twenty Months in the Andes* (New York, 1857).

**GOA POWDER, ARAROA, or CHRYSAROBIN.** A drug imported in the form of a yellowish or chocolate-colored powder. The name "Goa powder" is derived from the Portuguese colony of Goa, where the drug appears to have been introduced about the year 1852. It was exported from Bahia to Portugal, whence it found its way to the Portuguese colonies in Africa and Asia. The tree which yields it (*Andira araroba*) is met with in great abundance in certain forests

in the Province of Bahia, Brazil, preferring low and humid spots. It is from 80 to 100 feet high and is furnished with imparipinnate leaves, the leaflets of which are oblong, about  $1\frac{1}{2}$  inches long and  $\frac{3}{4}$  of an inch broad, and somewhat truncate at the apex. The flowers are papilionaceous, of purple color, and arranged in panicles. The Goa powder, or araroba, is contained in the trunk, filling crevices in the heartwood. To obtain it the oldest trees are selected as containing the larger quantity, and after being cut down are sawed transversely into logs, which are split longitudinally, and the araroba chipped or scraped off with the axe. During this process the workmen feel a bitter taste in the mouth, and great care has to be taken to prevent injury from the irritating action of the powder on the eyes. In this state, i.e., mixed with fragments of wood, the Goa powder is exported. Somewhat purified, as chrysarobin, it is used in the form of an ointment made by rubbing together 40 grains of the powder, 10 drops of acetic acid, and an ounce of lard. It is used in several skin diseases, especially in ringworm and psoriasis; and it owes its efficiency to the chrysophanic acid it contains.

**GOAR**, gô'ar', SAINT (c.585-649). A mediæval missionary, born in Aquitaine. According to the legends concerning him, he went (c.618) to Oberwesel, Germany, where he erected a chapel at what is now St. Goar and made numerous converts. He was buried in the chapel, and the monastery subsequently erected there became a chapter house in 1127. In 1768 the celebrated church of St. Goar on the Rhine was dedicated to him. His fête is July 6.

**GOAT** (AS. *gāt*, Icel. *geit*, OHG. *geiz*, Ger. *Geiss*; ultimately connected with Lat. *hædus*, kid). A genus (*Capra*) of ruminant quadrupeds of the family Bovidae, so closely allied to the sheep that it is not easy exactly to define the distinction, although the common domestic goat and sheep are of widely different appearance. One of the most marked of the distinguishing characters is that the horns of goats, present in both sexes, but smaller in the females, are long and directed upward, backward, and outward, while those of the sheep are more or less spirally twisted. Other characteristics are the beard on the chin of the male goats, which is wanting in the sheep, and the straight line of the face in goats, as compared with the arched line in sheep. The tail of goats is also much shorter than that of sheep. A constant mark of distinction is the absence in goats of a small pit between the toes of the hind feet (in some cases of all four feet), producing a fatty secretion, which exists in sheep and is peculiar to them. And another constant mark which is absent in sheep is the strong smell of male goats, particularly during the rutting season. Equally constant are the differences of temper and manners, goats being in a high degree curious and confident.

#### WILD GOATS

True wild goats, of which some 10 species are recognized, belong to the Old World alone, where they are confined to the mountainous region which extends from the Atlas ranges of north-western Africa to Central Asia. Some other animals called goats are zoologically otherwise related. All are essentially mountain animals and exhibit a great aptitude for scrambling among rocks and bushes, are extremely sure-

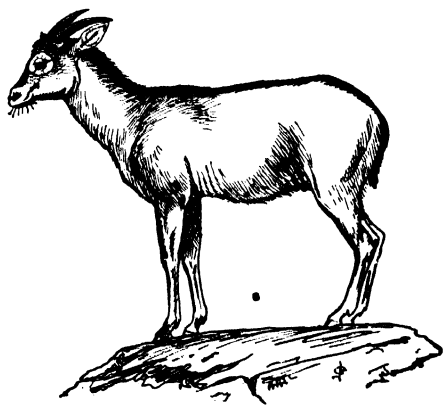
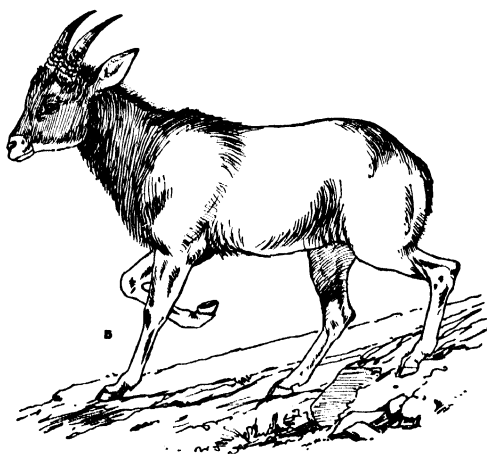
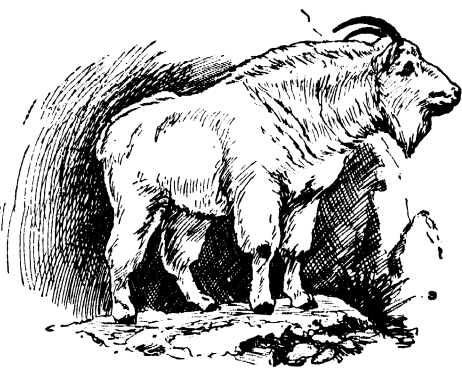
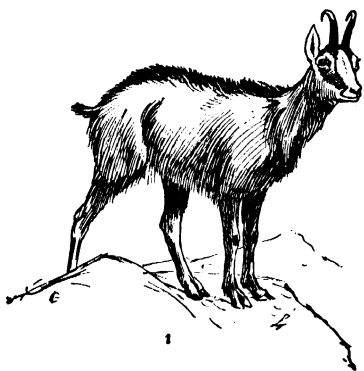
footed, and display great strength and agility in leaping. They also prefer as food the leaves and small branches of shrubs, and the strongly aromatic herbs which abound in mountainous localities, to the herbage of the richest pastures, browsing rather than grazing, as do sheep. They live in small herds, but the old bucks are likely to live separately, and thus serve the purpose of scouts, though all are extremely wary and hence are among the most difficult of game for the sportsman. Two kids are usually produced at birth, in late spring, and very quickly become able to travel with the band.

The best-known as well as most characteristic species of wild goat is the bezoar goat, or pasang (*Capra aegagrus*), which was once common throughout the Grecian Archipelago, but now is known only in Crete and one or two other islands and thence eastward through the highlands of Asia Minor to Persia and thence to northeastern India. It inhabits all barren hills in the East, but in Persia rarely descends much below the timber line. This goat (see Plate of WILD GOATS, ETC.) stands about 36 inches high and in winter is brownish gray, changing in summer to a more reddish-yellow tint, with the buttocks and underparts nearly white; and the older bucks have the forehead, chin, beard, throat, front of the legs, a stripe along the spine, the tail, and a band of the flanks dark brown. The horns of the old bucks measure 40 to 50 inches along the curve, rise close together from the top of the skull, and sweep backward in an even curve, with the front edge forming a strong keel marked by irregular prominences; the horns of the female are much smaller and smoother. The old bucks maintain a most vigilant watch, one or more being constantly on the lookout and warning the herd of danger. This is the species from which domestic goats have been derived. An illustrated account of this species will be found in the *Proceedings of the Zoological Society of London for 1875*, by C. G. Danford.

**Goats of the Caucasus, or Turs.** Three kinds of wild goats, distinguished as species, but perhaps only varieties of a single race, inhabit the Caucasus Range, which in form and color much resemble the pasang, though somewhat paler as a rule, and with long reddish-brown beard and short scut. Their horns, however, are very different, being very massive, smooth, and black, with a squarish cross section at the base, and sweeping outward and then inward, with a tendency towards a spiral, best shown in the Western, or Severtzow's, tur (see Plate of WILD GOATS, ETC.), which more nearly approach the form of the ibex's. The eastern Caucasus is inhabited by Pallas's tur (*Capra cylindricornis*); the central parts of the range, between Mount Elburz and Daghestan, by the Caucasian tur (*Capra caucasica*); and the western part by the larger, more ibex-like Severtzow's tur (*Capra severtzowi*).

**The Spanish Goat.** Closely allied to the turs is the wild goat, or "cabramontes" (*Capra pyrenaica*), of the mountains of Spain and Portugal. It is a smaller animal than the others, bucks standing about 26 inches in height, with horns measuring 25 to 28 inches in length. Its horns are divergent, tend to be spiral, are somewhat triangular in section, with a strong keel on their posterior border, and knobs along the outside. These goats are so wary and resourceful that they remain numerous.

# GOAT-ANTELOPES



1. EUROPEAN CHAMOIS (*Rupicapra rupicapra*).
2. JAPANESE SEROW (*Nemorhœdus crispus*).
3. WHITE GOAT of Rocky Mountains (*Oreamnus montanus*).

4. TAHR or HIMALAYAN GOAT (*Hemitragus jemlicus*).
5. HIMALAYAN SEROW (*Nemorhœdus bubalinus*).
6. HIMALAYAN GORAL (*Cemas goral*).



**Ibex.** All wild goats are frequently spoken of as ibexes, but the term should properly be restricted to four species of *Capra* dwelling upon the higher mountains of southeastern Europe, Syria, Arabia, Abyssinia, and in the Himalayan region. They have long, knobbed, scimitar-like horns. See IBEX.

**The Markhor.** This is a large wild goat (*Capra falconeri*) of the western Himalayas, distinguished by its high, upward-reaching, flattened and spirally twisted horns. (See Plate of WILD GOATS, ETC.) It is found from central Afghanistan to the sources of the Indus, and in this area exhibits several well-marked local races, in some of which the horns are much less twisted than in others, the longest measuring (along the curve) 50 inches. Its habitat ranges from barren foothills to the edge of the snow and includes much rocky forest land; the country, therefore, is always an exceedingly difficult one to hunt in, besides which the animals are wonderfully keen and watchful. Nevertheless, kids are captured from time to time and are found to thrive well in captivity and to interbreed with domestic goats. The markhor is larger than other goats and is distinguished by the great black beard of the old bucks, which covers the whole throat and breast with a mat of long hair, which also forms a heavy ruff around the shoulders. The remains of a goat closely resembling the markhor have been found in the Pliocene strata of India.

**Tahrs and Goat Antelopes.** There exist in southern Asia three species of goat which have no beards and small horns and are assigned to a separate genus, *Hemitragus*, the tahrs; one is known to Anglo-Indian sportsmen as "Nilgiri goat." For an account of this genus, see TAHR.

Intermediate between the goats and the antelopes stand several genera and species of mountain-loving animals, including the goral, cambingutan, serows, takin, chamois, and the American white goat. For these, see their names and GOAT ANTELOPE.

**Bibliography.** Lydekker, *Royal Natural History*, vol. ii (London, 1896); Blanford, *Fauna of India: Mammals* (ib., 1888-89); id., *Eastern Persia: Zoölogy* (ib., 1876); Danford, "Notes on the Wild Goat," in *Proceedings of the Zoölogical Society of London* (ib., 1875); Lydekker, *Wild Owm, Sheep, and Goats* (ib., 1898). Consult also the writings of sportsmen in India and Central Asia.

#### DOMESTIC GOATS

It is probable that the native Asiatic goats were among the first animals brought under the subjection of man, and there is no doubt that the main stock of those now in domestication was derived from the Persian pasang (see above). They must have been of peculiar value to the early nomadic men of southeastern Asia, since they could pasture on the scanty herbage and bushes of the rocky mountains and plateaus and move anywhere their masters went with even greater facility—conditions which domestic sheep could not well endure.

The varieties of the domestic goat are too many for treatment here, where only the most important can be mentioned. Those of Europe present many diversities of coat and form of horns, and distinguishable breeds are found in Ireland, Wales, and Norway; but no kind has the pendulous ears frequently seen in Asia, except a

cream-colored breed peculiar to the island of Malta, whose ears hang below the jaw. This goat and some Spanish breeds are frequently hornless. More distinctive breeds exist south and east of the Mediterranean. Thus, the "guinea" goats, kept in enormous flocks by the natives of the Sudan and of the Niger valley, are rather small, short-legged, short-haired, and usually dark in color, black and red prevailing. The horns are only 3 or 4 inches long and curve forward at their tips; and the black beard is continued downward to spread over the shoulders and forelegs, suggesting some possible ancestral cross with the aoudad (q.v.). The Nile valley and Egypt have a different goat, in which the legs and horns are longer; the profile is very convex, the horns crumpled, and often absent, and there is no beard. The short coat is usually reddish or bluish gray, more or less spotted, and the pendent ears are about as long as the head, flat, and round at the ends. The goats of Syria, Turkey, and southwestern Asia, on the other hand, are large and tall, with the hair long, black, and silky, prominent curving horns, a small beard in both sexes, and the ears hanging for half their length below the jaw. These are sometimes called mamber, or Kurd, goats, and are the common stock of the country. In Asia Minor, however, there has existed, from immemorial times, a remarkable breed known as mohair, or Angora, goats, which merit particular description, since lately they have been sedulously cultivated in various other countries, including South Africa and the United States.

**The Angora Goat.** Various types of Angora goats have arisen in Asia Minor and Turkey during the last half century, owing to unwise crossing with the common Kurd stock. The pure-bred Angora was originally a small, exceedingly delicate animal, with small thin horns, suggesting by their spiral form descent from the wild markhor. It was clothed with "dazzling white, fine, soft, silky, very lustrous mohair, curling in ringlets from 10 to 18 inches long." The continual crossing and recrossing it has undergone has resulted in an animal much larger and more hardy. The type now approved in the United States (see Plate of WILD GOATS) is strongly built, with a straight horizontal back, short and strong legs, the head like that of a common goat, but less coarse, and the horns heavy, with an inward twist. "Except the face and legs, from the hocks and knees down, the entire animal should be covered with mohair. Both the belly and throat and even the lower part of the jaws should have a covering of fine, silky mohair in long, curly ringlets." These goats were introduced into the United States by a gift of nine from the Sultan of Turkey in 1849. Little increase followed, and all disappeared during the Civil War. Other importations were occasionally made until 1881, when the Sultan prohibited any exportation of the animals. Several were, nevertheless, obtained for California breeders in 1901. Angoras were scattered through the Southern States, but their raising and keeping did not become an industry until recently, when large flocks were produced on the Pacific coast, especially in Oregon, and they have been successfully introduced in Iowa and Missouri. So promising have been these experiments that an extensive culture of this breed all over the United States, as well as in southern South America, is expected; and two clubs for the encouragement of the industry

and the registry of blooded stock have been organized. It is claimed for the Angora goats that they are among the most useful of domestic animals in a variety of ways. "The fleece, called mohair (q.v.), furnishes some of the finest of fabrics among ladies' goods and is used in various other manufactures; their habit of browsing enables the farmer in a wooded locality to use them to help in subjugating the forest; their flesh is exceedingly delicate and nutritious; the milk, though not so abundant as with the milch breed of goats, is richer than cow's milk; their tanned skins, though inferior in quality to the skins of the common goat, are used for leather; their pelts make the neatest of rugs and robes; they are excellent pets for children; a few of them in a flock of sheep are a protection from wolves and dogs; their manure is noticeably helpful to the grass, which follows them after they have cleaned away the underbrush." A pamphlet was issued by the United States Department of Agriculture in 1901, containing an account, with illustrations, of the breed, and its qualities and products, and full directions as to feeding, care, shearing, etc. See *Bibliography*.

Goats otherwise have never taken a serious place in the farm property of the United States. The latest agricultural statistics enumerate only 45,500 in the whole country—a number exceeded by such small countries as Cape Verde Islands and Senegal. The great bulk of the goats in the world, estimated at 36,000,000 in 1893, and 32,000,000 in 1898, are to be found in the south of Europe, in Syria, and in northern Africa. All the rest of the world together possesses scarcely a fifth of the total, and goats are almost absent from English-speaking countries the world over. The ordinary domestic goat is highly prized in oriental and tropical countries for its milk and its flesh which differs but little from that of sheep. The skins form an important article of commerce, the value of the goat skins imported into the United States ranging from \$20,000,000 to \$25,000,000 per annum and coming from China, Southern Russia, South America, and Mexico.

**The Cashmere or Shawl Goat.** Nowhere have goats, other than Angoras, received more attention or been brought to a higher usefulness than in India, where a long list of varieties might be named and described, such as the streaked "naga" of Assam, the "bukee" of the Deccan, the "maycay" of Mysore, etc. None of these equal in importance, however, those of the western Himalayan region, which are cultivated for the sake of their wool, of which the genuine Cashmere shawls are made. Two principal varieties of these are distinguished—the lesser, or chappoo, and the more common *changra*, or "shawl goat." This variety is rather small, of various colors, but generally silvery white, with long, flattened, spiral horns, and pendent ears. These goats are valued, not for the long outer hair, but for the underwool, or *pashm*, which in summer is combed out and appears like grayish down. It is beautifully fine, soft, and silky, and from it are made the famous and often extremely costly shawls of Kashmir and its neighborhood. These goats were introduced into France and Germany during the last years of the nineteenth century and have thriven well. Their natural home extends through Tibet through the mountains southwestward to the country of the Kirghiz,

and enormous flocks are pastured by the natives in the high Himalayan valleys.

For the "Rocky Mountain goat," see **ROCKY MOUNTAIN WHITE GOAT**.

**Bibliography.** Pegler, *The Book of the Goat* (4th ed., London, 1909); Schreiner, *The Angora Goat* [in South Africa] (London, 1898); Thompson, "The Angora Goat," in *United States Department of Agriculture, Farmers' Bulletin No. 137* (Washington, 1901); Robertson Scott, *The Case for the Goat* (New York, 1908).

**GOAT ANTELOPE.** A term applied by zoölogists to a group of ruminants having characteristics that join them to the goats on one side and the antelopes on the other; most of them, individually described elsewhere, have a more or less goatlike build, goatlike teeth, short tails, relatively small cylindrical horns, and no beards. The group includes the genus *Cemas* of the Himalayan region (see **GORAL**); the genus *Nemorhardus* of southeastern Asia, including the cambing-utan of Sumatra, etc. (see **SEROW**); the Tibetan genus *Budorcas* (see **TAKIN**); the genus *Rupicapra* of the European Alps (see **CHAMOIS**); and the genus *Oreamnus*, or *Haploceros*, which contains the white, woolly goats of northwestern America (see **ROCKY MOUNTAIN WHITE GOAT**). See **PLATE OF GOAT ANTELOPES**.

**GOAT FISH',** or **SALMONETE.** A marine fish of the genus *Upeneus*, closely related to the surmullets, many species of which exist in tropical American waters and are used as food as well as admired for their gaudy beauty. The red goatfish is *Upeneus maculatus*; the yellow is *Upeneus martinicus*. Both are common at Key West, Fla., and in the West Indies.

**GOAT ISLAND.** An islet roughly oblong in shape, a little more than  $\frac{1}{2}$  a mile long and somewhat less than  $\frac{1}{4}$  of a mile in average width, which divides the two great cataracts forming the Niagara Falls (q.v.). A bridge connects it with the American shore.

**GOAT LOUSE.** A biting louse of one or more species of the genus *Trichodectes*, parasitic in the hair of goats. Several species are known in various parts of the world, most widely *Trichodectes climax*. The species commonly troublesome on the Angora, or mohair, goats is regarded by some entomologists as peculiar to that animal and is named *Trichodectes limbatus*. Consult Osborn, "Insects Affecting Domestic Animals," in *United States Department of Agriculture, Division of Entomology, Bulletin 5* (Washington, 1897).

**GOAT MOTH.** One of the largest of European moths (*Cossus ligniperda*), measuring 3 to  $3\frac{1}{2}$  inches across the expanded wings, and brown, with various streaks and mottlings. In Great Britain the long, flat, hairy, yellowish caterpillar is called the auger worm, and wanders about in search of some suitable tree into which to bore a tunnel. It feeds upon the excavated wood more than three years, then spins at the extremity of the tunnel a very tough cocoon formed of wood chips glued together by a gummy secretion, in which a small aperture is left for the admission of air. The adults have no proboscis, take no food, are very short-lived, and take their name from the goatlike odor they exhale. Congeneric species dwell in the United States.

**GOATSBEARD.** See **SALSIFF**; also **SPIREA**.

**GOAT'S-RUE.** See **REST-HARROW**.

**GOAT'SUCKER.** The common European nightjar (*Caprimulgus europæus*), known anciently as "caprimulgus" in Italy and "aigothe-



las" in Greece, representative of a large cosmopolitan family of wide-gaped, nocturnal, moth-catching birds, the Caprimulgidae. The name is due to an immemorial popular belief that this bird milks goats. The notion probably arose from the habit of these birds of seeking insects, usually at dusk and near the ground, in pastures with domestic animals. Their strange leaping motions and great mouths would easily lend themselves to the construction of such a tale among primitive folk. See NIGHTJAR.

**GOBAT**, gó'bá' (CHARLES), ALBERT (1843-1914). A Swiss Parliamentarian, born at Tramelan, Canton Bern. He practiced law at Delemon from 1868 to 1882, when he was elected as a radical to the Great Council of Bern. In 1884 he became a member of the Federal Council of States, and in 1890 of the National Council. He became noted as an advocate of international peace and in 1902 received the Nobel prize (with Ducommun). He wrote a popular history of Switzerland (1900) and *Croquis et impressions d'Amérique* (1904). In 1907 he became head of the International Bureau of Peace in Bern.

**GOBAT**, gó'bá', SAMUEL (1799-1879). An English missionary, born at Crémère in Switzerland. In 1826, after studying at the Mission House in Basel, and learning Arabic, Ethiopic, and Amharic, he started as a missionary of the English Church Missionary Society to Abyssinia. Until 1829 he and his companion, Christian Kugler, got no farther than Cairo. Then they went to Gondar and met with much success. But in 1832, after Kugler's death and the beginning of hostilities, Gobat left the country. In 1839 he went to Malta, worked on the Arabic Bible, had charge of the presses there, and in 1845 was director of the Protestant College. A year afterward he was appointed (joint Anglican and Lutheran) Bishop of Jerusalem. There he did a great work, especially in his orphan schools and in the hospitals. His experiences in Abyssinia are described in *A Journal of a Three Years' Residence in Abyssinia* (2d ed., 1847; in French in Paris, 1834). Consult Schoelby, *Samuel Gobat, evangelischer Bischof in Jerusalem* (Basel, 1900), and Madame Roerich's biography (Paris, 1880; in German, Basel, 1884; in English, with preface by Shaftesbury, London, 1884).

**GOB'BO**, IL. See SOLARI, CRISTOFORO.

**GOBBO**, LAUNCELOT. A quaint, shrewd clown, in Shakespeare's *Merchant of Venice*, at first a servant to Shylock, whom he afterward deserts for Bassanio.

**GOBELIN**, gó'blán'. Any tapestry woven at the Gobelins, Faubourg Saint-Marcel, Paris, where the industry was established in 1601. (See TAPESTRY.) The origin of the name is shown by the inscription in French at the entrance gateway: "Jean and Philibert Gobelin, merchant dyers of scarlet, who left their name to this quarter of Paris and to the tapestry factory, had their works here at the end of the fifteenth century." The family prospered and from dyers finally became financiers, two of them at the end of the sixteenth century acting as first presidents of the Chamber of Accounts, and a third later acquiring the title of Marquis of Brinvilliers. Dyeing being beneath their dignity, they were glad to dispose of the property. The name, however, remained and became so closely identified with the tapestry industry established by Comans and Planche on the invitation of Henry IV, that in Germany gobelin

still is, and elsewhere for a time was, the name of any picture tapestry, even one woven long before 1440, when Jean Gobelin moved from Rheims to Paris. Consult: Guiffrey, *Les Gobelins et Beauvais* (Paris, 1906); Fenaille, *L'Etat général des tapisseries de la manufacture des Gobelins depuis son origine jusqu'à nos jours* (5 vols., ib., 1903-12); Hunter, *Tapestries* (New York, 1912). See EMBROIDERY.

**GOBE-MOUCHE**, gób-móosh' (Fr., gaping mouth). Originally the name of a certain species of birds termed flycatchers. In its transferred use it refers to a silly or credulous person who has no opinion of his own or to one who is generally idle.

**GOBI**, góbè, or **SHAMO**, shá'mó'. A vast desert region of Central Asia, constituting the eastern extension of the arid belt that stretches across the whole breadth of the Asiatic continent into Africa (Map: Asia, L 4). As generally defined, it includes only the desert area of Mongolia from the confines of Sinkiang on the west to the Khingan Mountains on the east, although some geographers extend its western limits to Lob Nor, in about long. 90° E. East of the Khingan Range is a smaller arid region, commonly called the Eastern Gobi. The Gobi has the form of a great plateau, whose surface, lying 3000 feet or more above the sea, is divided into dreary wastes of sand, rocky table-lands, and mountains. The climate is severe, especially on the borders, and the rainfall scanty; the precipitation being generally sufficient, however, to furnish pasturage for flocks and herds during the summer months. Most of the nomadic tribes inhabiting the interior are Buddhists. The permanent settlements are confined to the northern part, which is traversed by spurs of the Tian-Shan, Altai, and Yablonoi mountains. A number of caravan routes lead across the desert from China proper to Siberia. Some allusions to the Gobi Desert are found in the writings of Marco Polo, but the first definite information we owe to the Jesuit Gerbillon, who made several journeys across the country in 1688-98. It was later visited by the Dutchman Ysbrand Ides, in 1692-94, and twice (1727-28 and 1736) by Lorenz Lange, who was sent by the Russian government to Peking. The most accurate and valuable information about the desert was obtained by explorers in the last 50 years, especially by Przhevalski and Sven Hedin (qq.v.).

**GOBINEAU**, gób'énó', JOSEPH ARTHUR, COUNT OF (1816-82). A French Orientalist, born at Ville-d'Avray, near Paris. He held various diplomatic positions in Europe and represented France at Athens, at Rio de Janeiro (1868), and Stockholm (1872-77). His works include: *Trois ans en Asie* (1859); *Les religions et les philosophies de l'Asie centrale* (1865; 3d ed., Paris, 1900); *Traité des inscriptions cunéiformes* (2 vols., 1864); *Histoire des Perses* (2 vols., 1869); *Histoire d'Ottar Jarl, pirate norvégien* (1879); *Essai sur l'inégalité des races humaines* (4 vols., Paris, 1853-55), translated into English under the title *Moral and Intellectual Diversity of Races* (Philadelphia, 1856) and into German by Schemann (Stuttgart, 1898-1901); and *Pages choisies*, a volume of selections edited by Morland (Paris, 1905), in which can be found a brief biography (pp. 5-45). Consult: Kretzer, *Gobineau* (Leipzig, 1902); Seillière, *Le comte de Gobineau et l'aryanisme historique* (Paris, 1903); Kleinecke, *Gobineaus Rassenphilosophie* (Berlin, 1902).

**GOBLET, RENÉ** (1828-1905). A French statesman. He was born at Aire-sur-la-Lys, studied law, and practiced with great success at Amiens. Already distinguished for his democratic principles expressed in his paper, the *Progrès de la Somme*, at the fall of the Empire he became procureur général at the court of Amiens. In 1871 he was elected to the National Assembly, where he joined the Republican Left and was soon recognized as an orator of rare ability. In 1876 he failed of reelection to the Chamber, but was successful in 1877 and 1881. In 1879 he was appointed Undersecretary of State for Justice, and in 1882 was appointed Minister of the Interior in the Freycinet cabinet, but in the crisis brought about by the Egyptian question and because of the attacks made upon the ministry of Freycinet, he, with the other members, resigned. Goblet was appointed Minister of Education and Public Worship in the Brisson ministry (April, 1885) and energetically continued his reform policy. He retained his portfolio in the Freycinet cabinet, which went out of office in December, 1886, when he became Prime Minister. His ministry was overthrown in May, 1887, because of his unpopular efforts towards radical change in the municipal organization of Paris and because he was weak in the Schnaebele affair with Germany. He had been much embarrassed besides by his Minister of War, Boulanger. From April, 1888, to February, 1889, he held the portfolio of Foreign Affairs in the Floquet cabinet. He was elected senator in 1891, and as such warmly supported anticlerical measures and, together with Lockroy, Sarrien, and Peytral, drew up a political programme of action of which the *Petite République Française* is the organ. From 1893 to 1898 he was again a member of the Chamber of Deputies, where he voted with the Radicals. In 1902 he protested against Combes's action in closing schools conducted by the religious orders.

**GOBLET D'ALVIELLA**, gô'blâ' dâl-vyél'la, ALBERT JOSEPH, COUNT (1790-1873). A Belgian general, born at Tournai. He served in the French army in 1811-14 and then in the Dutch, and was Minister of War after the revolution of 1830, which post he exchanged in 1832 for the Ministry of Foreign Affairs. From 1837 to 1839 he was Ambassador to Portugal and was adviser to the young Queen, Maria da Gloria, from whom he received the title of Count d'Alviella. In 1839, returning to Brussels, he became Minister without portfolio, was again Minister of Foreign Affairs from 1843 to 1845, and exercised a considerable influence upon the public measures advocated in the Chamber. As a military engineer, he planned the defenses of northern Belgium and the extension of the fortifications of Antwerp. His principal publications are *Des cinq grandes puissances de l'Europe dans leurs rapports politiques et militaires avec la Belgique* (1863) and *Dix-huit mois de politique* (2 vols., 1865). Consult the biographical sketch by Juste in *Les fondateurs de la monarchie belge*, vol. viii (Brussels, 1870).

**GOBLET D'ALVIELLA**, EUGÈNE, COUNT (1846- ). A Belgian historian of religion, grandson of Albert Joseph. He was a member of the Chamber of Deputies in 1874-78 and of the Senate in 1892-94 and after 1900. He became in 1894 professor of the history of religion at the University of Brussels. In 1875 he accompanied the Prince of Wales, (later Edward

VII) on the latter's journey to India. He also became a collaborator on the *Revue de Belgique*. In addition to descriptions of travel, *Sahara et Lapone* (Eng. trans., "Sahara and Lapland," 1874), *Inde et Himalaya*, and several other works, he published notably: *L'Évolution religieuse contemporaine chez les Anglais, les Américains et les Hindous* (1884; Eng. trans. by Moden, "The Contemporary Evolution of Religious Thought in England, America, and India," 1885); *La migration des Symboles* (1891; Eng. trans., "The Migration of Symbols," by Sir George Birdwood, 1894), his most important volume, whose thesis is that "the religious symbols common to the different historical races of mankind have not originated independently among them, but have for the most part been carried from one to the other in the course of their migrations, conquests, and commerce"; the (Hibbert) *Lectures on the Origin and Growth of the Conception of God as Illustrated by Anthropology and History* (1892); *Ce que l'Inde doit à la Grèce* (1897); *Croyances, rites, institutions* (3 vols., 1911). He made the study of symbols a recognizedly valuable branch of archaeology.

**GOBLINS** (OF. *gobelin*, from ML. *cobalus*, Gk. *κόβαλος*, *kóbalos*, rascal). Spirits of popular superstition, grotesque in appearance, and generally malicious, who live in woods or caves and often lurk about houses. They are called hobgoblins, perhaps a corruption of hopgoblin. See DEMON.

**GOBLINS, THE**. A sparkling comedy, interspersed with songs and music, by Sir John Suckling, first acted at Blackfriars in 1638 and revived at the Theatre Royal, Jan. 24, 1667.

**GOBONY**. A term in heraldry. See COMRONÉ.

**GOB'SECK**. A novel by Balzac (1830).

**GOBY** (from Lat. *gobio*, *gobius*, gudgeon, from Gk. *γάβίος*, *gábios*, gudgeon). A spiny-rayed fish of the family Gobiidae, whose ventral fins are completely united into a disk more or less capable of being used as a sucker, enabling the fish to cling to rocks and so resist the power of waves and currents. They have no air bladder. The true gobies are generally small fishes, some of them inhabiting the shallow bays of the coast, and others deeper water; the species are very numerous and belong to both hemispheres. One species (of Russia) inhabits fresh water alone. The gobies are very interesting, on account of their habits, and are of the number of nest-building fishes, employing seaweeds and eel grass for this purpose in spring. When the female has deposited her eggs in the nest, the male watches over them till they are hatched. In Europe, consequently, these fishes are much in request for aquaria, of which they are among the most interesting occupants. A British species (*Gobius minutus*), which ascends rivers, chooses a cockleshell for its home in some tidal pool. "The shell being placed on the sand with its concave surface downward, the sand beneath it is hollowed out and cemented by a special mucilaginous secretion from the skin; a cylindrical tunnel gives access to the nest, and the whole structure is covered over with loose sand." The female having glued her eggs to the shell, the male guards them for six to nine days, until they hatch. Another European goby (*Lar-trunculus pellucidus*), which is nearly transparent, is remarkable for being perhaps the most

short-lived of all vertebrates, being born in mid-summer, maturing during the following winter, and spawning and dying upon the approach of summer, so that none live more than a year. Small species of several genera inhabit the coast and estuaries of the southern United States and of California. See MUDFISH.

**GOCH**, gōg, JOHANNES VON (properly JOHANN PUPPER, or CAPUPPER) (c.1400-75). A German Augustinian monk. He was born at Goch, Prussia, studied at Cologne and probably at Paris, and was the founder (1459) of an Order of Canonesses at Tabor, near Mechlin, Flanders, of which he subsequently became prior. A precursor of the Reformation, in his writings, *De Libertate Christiana*, *De Quatuor Erroribus circa Legem Evangelicam exortus*, and *Epistola Apologetica* (1521), he attacks the influence of Pelagianism in the church, and advocates a return to the text of the Bible as the only true source of religious truth. He was considered a man of profound piety, and as a theologian was unexcelled in his day. Consult Clemen, *Johann Pupper von Goch* (Leipzig, 1896).

**GÖCKINGK**, gē'kīnk (also spelled GOEKINGK and GÖKINGK), LEOPOLD FRIEDRICH GÜNTHER VON (1748-1828). A German poet. He was born at Gröningen and was educated at Halle. After occupying various official positions under the government at Magdeburg, Wernigerode, and Berlin, and acting for several years as privy counselor to the Prince of Orange-Fulda, he in 1826 removed to Berlin and subsequently to Wartenberg, Silesia. His *Lieder zweier Liebenden* (3d ed., 1819) won for him great popularity in Germany towards the close of the eighteenth century. His *Gedichte* (rev. ed., 1821) contain the excellent *Episteln* and *Sinngedichte* (separately published, 2d ed., 1778). The latter are occasionally characterized by a vein of modern political satire. Consult Göckingk's correspondence with Bürger (q.v.) in Strodtmann, *Briefe von und an Bürger* (4 vols., Berlin, 1874), and Kasch, *Leopold von Goekingk* (Marburg, 1909).

**GOD** (AS., OS., Dutch *god*, Goth. *gub*, OHG. *got*, *cot*, Ger. *Gott*, of doubtful etymology, perhaps connected with Skt. *hū*, to call, or with Skt. *ku*, Gk. *χεῖν*, *chein*, to pour; the word is evidently originally a passive participle; the frequent derivation of *god* from *good*, AS *gōd*, Goth. *gōds*, OHG. *guot*, Ger. *gut*, is entirely erroneous). Two types of definition of God are possible. One is the maximum definition, which defines God in terms of the highest conceivable religious ideas. According to this, God is the eternal and infinite personal Spirit, the Creator and Governor of the universe, the loving Father of all men. The other is the minimum definition so framed as to include the god of any historic religion, however primitive. A wide variety of such definitions have been given, which may be summarized thus: an extrahuman power, treated as personal, and conceived of as exercising control over some sphere which affects human life. In primitive religion any spirit may, by gaining more power and so winning worshippers and a cult, become a god. Man needs help for various things, and those powers to which he feels that he can appeal in any personal way become for him gods.

The idea of gods once introduced, the tendency is towards a multiplication of gods, whence arises polytheism. A tendency soon becomes marked to ascribe to one god the control over

some restricted portion of country or over the affairs of one family. This produces a "henotheism" within a restricted group of persons, which may be perfectly consistent with polytheism and polytheistic worship apart from the restricted circle to which this one god belongs. But with the growth of the family into a tribe, and of the tribe into a nation, the sphere of the god is also enlarged, and victories over other nations, as well as the attempt to find a single cause behind all things, will produce ultimately the idea of one god, beside whom all other gods are only pretended gods, having no real existence. Thus monotheism must develop. The Hebrew conception of God grew from an early tribal god to a national deity, caring for the welfare of the Hebrew nation. Under the prophets the conception came to be strongly moral, and Jehovah, the national God, became a God of social righteousness: "What doth the Lord require of thee but to do justly and to love mercy and to walk humbly with thy God?" (Mic. vi. 8.) The contact with other nations led the prophets to see that their God must be conceived as controlling the nations if he was to guide the fortunes of Israel. In this way Hebrew thought developed an ethical monotheism. By the time of the beginning of the Christian era the Hebrew idea of God was that of a Being, the sole cause of all things, omniscient and omnipotent, benevolent, rewarding the good and punishing the evil, and guiding the world to the fulfillment of His own purpose. The idea, however, was still nationalistic. While Jehovah was the God of the whole world, Israel was His particular care. This conception of God Christianity took over, only emphasizing the idea of God as a loving Father, and, when the new religion passed from the Hebrews to the Greeks, putting the Christian Church for the Hebrew nation as the object of God's peculiar care. Every age has a different conception of God, and the Christian idea has developed as the conceptions of ethics and of the brotherhood of the world have advanced. Theology has brought forward various proofs of the existence of God. 1. The first proof is the so-called cosmological, from the mere existence of a dependent world, which does not bear in itself the marks of eternal and independent existence, to an independent something which shall be its cause. This leaves the doctrine in a very vague condition. 2. The theological proof adds definiteness to it. In innumerable individual objects, like the plants, in the adaptations of the chemical elements to each other, the construction of the bodies of animals and of the mind of man, and in the whole universe as revealed more and more by modern study, we see evidences of plan. The Cause of the world is therefore capable of making a vast plan; He possesses intelligence and will, i.e., rational personality. 3. The moral proof argues from the nature of man himself, especially as a moral being, to the nature of God as also moral, or benevolent, which argument is supplemented by the Christian argument which draws the conclusion from the experience of regeneration that God positively seeks to promote the holiness of men. 4. These arguments are completed by the ontological argument, which in its best form ascribes to the highest conception which man is able to form of God (the Christian conception) objective validity, on the basis of the proposition that it is fundamentally inconceivable that the highest

conception at which the mind of man can arrive should be a mere subjective creation.

The modern objection to this line of proof began with Kant, who declared it to be an application of the principle of causality beyond the bounds set by nature as an intellectual principle given man for the knowledge of empirical objects. The Sensational school, which Kant was opposing, has also denied the application of causality to reach beyond experience on various grounds. Mill was chiefly influenced by the complexity of the investigation, and particularly by the difficulties created by the existence of pain and sin. Spencer, who has carried this school to its natural results and combined a developed theory of evolution with sensationalism, has based his objections upon the doctrine of the relativity of knowledge, which makes such a conception as that of a first cause essentially unintelligible. In a more popular form the objection is raised against the idea of God that it is incapable of proof, by which is meant such proof as is given to the propositions of natural science, experimental and tangible proof.

It has sometimes been claimed that the idea of God is innate in the soul. If by this is meant that every man has by nature the idea of one infinite person, the claim is manifestly false, for the existence of polytheism at once disproves it. But if it be meant that there are innate in the mind certain principles, such as that of causation, which impel the mind to look up from phenomena to their source, and that the examination of all the phenomena belonging to this sphere will finally give to man the knowledge of God, the proposition in this sense is true. The argument is thus mingled of *a priori* and *a posteriori* elements. The former are necessary as the rational foundation of the argument, the latter to give it contents and to lead it to the concrete result of the being of God. See THEISM.

**Bibliography.** Among the numerous excellent treatises of recent times upon theism may be mentioned as the best: Orr, *Christian View of God and the World* (London, 1897); Flint, *Theism* (ib., 1886); id., *Anti-Theistic Theories* (Edinburgh, 1884); Martineau, *A Study of Religion* (Oxford, 1888); id., *The Idea of God* (Boston, 1887); Fiske, *Through Nature to God* (ib., 1899); Clarke, *The Christian Doctrine of God* (New York, 1909); Adeney, *The Christian Conception of God* (ib., 1912). For a modern theory of the origin of the idea of God, consult King, *The Development of Religion* (ib., 1910).

**GODARD, gô'dâr', BENJAMIN** (1849-95). A French composer, born in Paris. He was a precocious child and, after studying the violin with Richard Hammer, entered the Paris Conservatory, where his teachers were Vieuxtemps (violin) and Reber (composition). In 1865 a violin sonata was published, and shortly afterward Godard received a prize from the Institut de France. From this time on, his compositions followed each other rapidly. While not works of genius, they are characterized by felicity of expression and met with considerable popular favor. His most successful opera was *La vivandière*, produced at the Opéra Comique shortly after his death. He also wrote: *Pedro de Zalamea* (1884); *Jocelyn* (1888); *Le Dante* (1890); *Joanne d'Aro* (1891); and numerous symphonies, suites, concertos, and songs.

**GODAVARI, gô-dâ'vâ-rê.** One of the principal rivers of the peninsula of India, and the largest of the Deccan, rising within 50 miles of

the Arabian Sea in the Western Ghats, near Dindori (Map: India, C 5). It flows southeast for 900 miles across the peninsula into the Bay of Bengal. Dividing at Rajamandry, it enters the sea by two principal mouths—the northern at the French town of Yanaon and the southern at Narsapur. About 23 miles above the head of the delta the Godavari emerges near Rampa from the Eastern Ghats. It is navigable for 300 miles. Its northern tributaries are the Purna, the Pranhita, the Indravati, and the Saveri; from the south it receives the Manjera and the Maner.

**GOD'DARD, ARABELLA** (MRS. J. W. DAVISON) (1836- ). An English pianist. She was born, of English parentage, in Brittany, studied in Paris under Kalkbrenner and in London under Mrs. Anderson and Thalberg, and made her first public appearance in 1850 at the Grand National Concerts at Her Majesty's Theatre. She continued her studies under Davison, whom she married in 1860. Her most brilliant success was in her interpretation of the last compositions of Beethoven. In 1873-76 she made a successful tour of the world, including America, Australia, and India, and in 1880 retired from professional concert giving.

**GOD'DESS OF REASON.** The new divinity set up by the French Revolutionists in their attempted reconstruction of religion in 1793. On November 10, in the cathedral of Notre Dame, changed into a Temple of Reason, the goddess was installed with much ceremony. The part of the goddess was taken by an actress, dressed in white and wearing the Phrygian cap and the tricolor. The cathedral was restored to its proper functions by Napoleon in 1802.

**GODEBSKI, gô-dêb'skê, CYPRIEN** (1835-1909). A Polish sculptor, a son of Xavier Godebski. He was born at Méry-sur-Cher, France, and was educated at the Polish school, Bati-gnolles, and in the studio of Jouffroy. He spent many years in Galicia and at St. Petersburg. His principal works include: "The Awakening," a marble statue (1886); "Children," a bronze group for a Polish school (1880); "The Angel of the Fatherland Protecting Two Orphans"; "Brutal Force Suffocating Genius" (Toulon Museum); busts of Rossini, Vieuxtemps, Zichy, Servais, Prince Gortchakov, Kraszewski, and others, and the statues of Generals Landon and Lassay, in the Vienna Arsenal. He also executed a fine monument of the composer Moniuszko, in Warsaw Cathedral; a monument to the heroes of the Crimean War, at Sebastopol; the tomb of the tenor Tamberlik, at Père Lachaise Cemetery, Paris; and various other monumental works. Many of his later statues are polychrome, e.g., "A Dream of Glory."

**GODEBSKI, gô-dêb'skê, KSAWERZ or XAVER** (1801-66). A Polish author, born at Frankenthal, a son of Cyprien Godebski, poet and patriot (1775-1809). He was for many years professor in a Polish school at Paris. His literary work includes the edition of his father's more important writings, works on politics and history, especially a life of Plater (1848), and the studies on social reform in Poland in the eighteenth century (1866), and on the spirit of the times (1860). He also translated several French plays into Polish.

**GODEFROY, gôd'frwâ' (Lat. Gothofredus).** The name borne by a family of distinguished scholars and jurists of French origin.—DENIS GODEFROY (1549-1622) was born at Paris and,

after studying at Louvain under Ramus, completed his education at the universities of Cologne and Heidelberg. It was probably at this last place that he adopted Protestant tenets. In 1579 Godefroy quitted France and became a professor of law at Geneva. In 1589, having returned to France, he was made bailiff of the District of Gex; but, his house having been pillaged and his library burnt by the troops of the Duke of Savoy, he retired first to Basel and later to Strassburg, where in 1591 he was given the chair of Roman law and history. In 1605 the Elector Palatine of the Rhine called him to be head of the faculty of law at Heidelberg. In 1618 he was sent as envoy to Paris from Frederick V to Louis XIII. Though numerous offers were made to him, Godefroy preferred to remain at Heidelberg, but in 1621 the presence of the army of the Catholic League under Count Tilly forced him to seek refuge at Strassburg, where he died Sept. 7, 1622. His most important work was his edition of the *Corpus Juris Civilis* (Geneva, 1583), which was long the standard text. He was also the author of numerous works on jurisprudence and on the classics.—THÉODORE GODEFROY (1580-1649) was the eldest son of Denis Godefroy. In 1602, after being educated at Geneva and Strassburg, he settled in Paris and abjured Protestantism. Although an advocate before the Parliament of Paris, he devoted most of his time to the study of history and eventually became the historiographer royal of France. During the latter half of the Thirty Years' War he was employed as one of the French diplomats at Cologne and Münster and helped negotiate the Peace of Westphalia in 1648. He died at Münster, Oct. 5, 1649. He was the author of numerous works in French history and politics and made a large and important collection of documents for the history of France and of other countries. This was continued by his son DENIS (1615-81) and in 1749 found its way into the library of the Institut de France.—JACQUES GODEFROY (1587-1652), the younger brother of Théodore, passed his life as professor of law at Geneva and remained true to his Protestant convictions. He held many important public offices during his stay in Switzerland. He is known as the editor of the *Theodosian Code* (Lyons, 1605), upon which he worked for 20 years, and which is still used by jurists. Besides this, he published a multitude of works on law and jurisprudence, and he ranks higher as a scholar than even his learned father.—Others of the Godefroy family who were distinguished in their time are: JEAN GODEFROY, Sieur d'Aumont (1656-1732, the third son of the younger Denis, and an historian of note; DENIS CHARLES GODEFROY, MARQUIS OF MEUILGLOIRE (1795-1877), the family biographer and a scholar of ability. He published *Les savants Godefroy* and *Mémoires d'une famille pendant les XVIème, XVIIème, et XVIIIème siècles* (1873).

**GODEFROY**, gôd'frwâ', FRÉDÉRIC (1826-97). A French literary historian. He was educated for the most part privately and early devoted his leisure to the study of French language and literature. His *Lexique comparé de la langue de Corneille* (1862) was crowned by the Academy. He also wrote a *Histoire de la littérature française depuis le XVIème siècle jusqu'à nos jours* (1859-78; 2d ed., 1878-81). With governmental support he prepared the voluminous and important *Dictionnaire de l'an-*

*cienne langue française et tous ses dialectes du IXème au XVème siècle* (10 vols., 1880-1903). This work, laboriously compiled from all authoritative printed and manuscript sources, remains, despite certain defects, a standard reference book.

**GODERICH**, gôd'rich. See RIPPON FREDERICK JOHN ROBINSON, EARL OF.

**GODERICH**. A popular summer resort and the county seat of Huron Co., Ontario, Canada; a port of entry on Lake Huron, at the entrance of Maitland River, and on the Grand Trunk and the Canadian Pacific railroads (Map: Ontario, C 6). It has a good harbor and steam communication with all lake ports. There are salt refineries, flour and lumber mills, an organ factory, iron foundries, tanneries, grain elevators, and manufactories of wheels, road machines, and knitting machines. The surrounding district supplies excellent limestone, sand, and clay for manufacturing purposes. Pop., 1901, 4158; 1911, 4522.

**GODESBERG**, gô'des-bêrk. A watering place in the Prussian Rhine Province, situated near the left bank of the Rhine, 4 miles below Bonn. It has an alkaline chalybeate spring, believed to have been known to the Romans, a hydro-pathic establishment, and numerous fine villas with gardens. It has extensive industries in quilting and brickmaking. A short distance from the village lie the ruins of the castle of Godesberg, erected by Archbishop Dietrich of Cologne in the thirteenth century. Pop., 1900, 8927; 1910, 10,644. Consult Dennert, *Godesberg, eine Perle des Rheins* (Godesberg, 1900).

**GODET**, gô'dâ', FRÉDÉRIC (1812-1900). A Swiss Protestant theologian. He was born at Neuchâtel and was educated in that city and at Bonn and Berlin. In 1850 he was appointed professor of theology at Neuchâtel and in the following year received a pastorate which he held until 1866. In 1873 he helped to found the Evangelical church of Neuchâtel, independent of the state, and was a professor in its faculty of theology. As a prominent representative of Reformed orthodoxy, Godet exercised a very wholesome influence on the development of religious thought in Switzerland, further stimulated by his published works, particularly by his commentaries, which are marked by great delicacy of exegesis. He wrote: *Histoire de la réformation et du refuge dans le pays de Neuchâtel* (1859); *Commentaire sur l'évangile de Saint-Jean* (1863-65; 3d ed., 1881-88), which has been translated into English (1886), German, Dutch, and Danish; *Commentaire sur l'évangile de Saint-Luc* (1871; 3d ed., 1889; Eng. trans., 1875); *Commentaire sur l'épître aux Romains* (1879-80; 2d ed., 1890; Eng. trans., 1881); *Études bibliques* (4th ed., 1889; Eng. trans., first part, *Old Testament Studies*, 3d ed., 1885, second part, *New Testament Studies*, 6th ed., 1885); *Lectures in Defense of the Christian Faith* (4th ed., 1900).

**GODEY**, LOUIS ANTOINE (1804-78). An American publisher, born and educated in New York City. From 1830 to 1877 he conducted at Philadelphia *Godey's Lady's Book*, the first woman's periodical in the United States. Among his other publications were *Jarvis's Musical Library* and the *Young People's Book*.

**GODFATHER AND GODMOTHER**. The sponsors of candidates for baptism, and, in the Roman Catholic church, of candidates for confirmation. See SPONSORS.

**GODFREY, SIR EDMUND BERRY** (1621-78). An English magistrate, born in Kent and educated at Christ Church, Oxford. He became a justice of the peace for Westminster, and in 1666 was knighted for his efficient work during the plague. In 1678 he received the depositions of Titus Oates (q.v.) concerning the "Popish Plot." Shortly afterward he was found dead near Hampstead. The public immediately accused the Roman Catholic priests of having murdered Godfrey, and subsequently a man named Miles Prance was induced to make a confession implicating the Catholics. As a result of this confession, three men were hanged for the crime; but Prance, when accused of perjury, finally (1686) admitted that he had concocted his evidence. Considerable controversy arose as to how Godfrey met his death—some claimed he had committed suicide—but though the evidence pointed to murder, the mystery was never solved. Consult John Pollock, *The Popish Plot* (London, 1903), and Alfred Marks, *Who Killed Sir E. B. Godfrey?* (ib., 1905).

**GODFREY, THOMAS** (1704-49). A self-taught American mathematician, who acquired some reputation from an improvement which he made in Davis's quadrant. (See **SEXTANT**.) He was a man of temperate habits, a humble artisan in Philadelphia, but he was sufficiently interested in science to learn Latin that he might read the better class of mathematical literature of the time. The improvement in the quadrant seems to have been due to him, but there was a dispute between him and John Hadley of England as to the priority of the invention. The Royal Society considered the claims of both parties and rewarded each, sending to Godfrey gifts to the value of \$1000. The account in the *Philosophical Transactions* of the Royal Society of London (abridged ed., London, 1809, vol. vii, p. 667, for 1734) speaks of him as "having under the greatest disadvantages made himself master of the principles of astronomy and optics, as well as other parts of mathematical science," and as having made his invention in 1730, the first account of it appearing two years later.

**GODFREY DE BOUILLON**, de bō'yōn' (c.1058-1100). One of the leaders of the First Crusade and the first Latin ruler of Jerusalem. He was the son of Eustace of Boulogne and Ida, sister of Gozelo, or Godfrey, the Humpbacked, of Lower Lorraine. The year of his birth is uncertain, but it was about 1058. His family traced its descent from Charles the Great, and later legends made Lohengrin, "the Knight of the Swan," Godfrey's progenitor. In the strife over investiture (q.v.) he was on the side of the Emperor, and it was said that he was the first to scale the walls of Rome when it was attacked by Henry IV in 1084. The legends also recount how he was stricken with disease because of his sacrilege at Rome and then miraculously healed when he took the Crusader's vow. In 1099 he became Duke of Lower Lorraine. He was one of the leaders in the First Crusade (1096-99), but not commander in chief, and after the capture of Jerusalem was elected "Baron and Defender of the Holy Sepulchre." According to an untrustworthy legend, he was offered the title of King, but refused "to wear a crown of gold where the Savior had worn a crown of thorns." He held this dignity for about a year, and died July 17 or 18, 1100. Godfrey is described as a man of large stature

and great bodily strength. Many feats of bravery and strength are ascribed to him, such as his combat single-handed with a ferocious bear, or his cleaving asunder the body of a Moslem emir with a single blow of his sword. He made an excellent and energetic ruler of Jerusalem. Many legends clustered about his name, and many deeds were falsely imputed to him. Consult: Sybel, *Geschichte des ersten Kreuzzuges* (Leipzig, 1900); Froboese, *Gottfried von Bouillon* (Berlin, 1879); Rohricht, *Die Deutschen im Heiligen Lande* (Innsbruck, 1894); Pigeonneau, *Le cycle de la croisade et de la famille de Bouillon* (Saint-Cloud, 1877). Hagenmeyer, *Gesta Francorum* (Heidelberg, 1890), gives a bibliography of all the best works on Godfrey. See **ASSIZE OF JERUSALEM**; **CRUSADE**.

**GODGIFU**. See **GODIVA**.

**GODHAVN**, gōd'hāv'n. A town of Greenland, on the south coast of Disco Island (Map: America, North, N 3). It is the residence of the Danish Inspector of the Northern Inspectorate, and has some fishing industries. Godhavn, also called Lievey, is mainly known in America as the stopping place of many polar expeditions. Pop., 300, of whom five only are Danes.

**GODIN, gō'dān', AMÉLIE**. See **LINZ, AMÉLIE**.  
**GODIN, gō'dān', JEAN BAPTISTE ANDRÉ** (1817-88). A French socialist, born at Esquehéries, in the Department of Aisne. He came from an artisan family, and received the meagre education which was given to boys of his class at that time. When 17 years old he began a trip through France, in order to perfect his skill as an artisan. Three years afterward he was a workman in Esquehéries. A small workshop which he established in 1840 prospered and in 1846 employed about 30 men. He removed to Guise, in order to find a better market for his wares. He found time to pick up a very fair education, and became deeply interested in the writings of certain socialists, especially Fourier. He contributed 100,000 francs to the unsuccessful project of Victor Considérant (q.v.) to found a Fourieristic colony in Texas. In 1859 he began the construction of the buildings for his co-operative association, or *familiatère*, and before 1886 had fully established profit sharing. By his plan profits in excess of 5 per cent on capital were to be divided between labor and capital in the ratio of aggregate wages to aggregate minimum profits. Prior to this distribution, however, a sum was to be set aside for education, insurance against sickness and old age, etc. At his death he left almost his entire personal fortune (about 2,500,000 francs) to the association. Almost all the shares in the association are at present held by the workers, numbering some 1200.

Godin had some success in politics. He was elected president of the municipal commission of Guise in 1870, and member of the National Assembly in 1875. In 1882 he was made Knight of the Legion of Honor. He published several books, the chief of which are: *Solutions sociales* (1871); *La politique du travail et la politique des privilèges* (1875); *La souveraineté et les droits du peuple; le gouvernement et le vrai socialisme en action* (1883); *La république du travail et la réforme parlementaire* (1889). Consult Bernadot, *Le familiatère de Guise et son fondateur* (Paris, 1899), and D'Isambert, *Les idées socialistes en France* (ib., 1905). See **FOURIERISM**.

**GODIN, LOUIS** (1704-60). A French astronomer, born in Paris. He studied at the Lycée Louis le Grand and under Delisle. On May 16, 1735, he started on an expedition to South America to measure a degree of the meridian by geodetic methods. He arrived at Quito, Peru, in February, 1736, established two astronomical stations in the Andes, and was subsequently appointed professor of mathematics at Lima, where, in 1740, he made important seismological studies during the famous earthquake. A year after his return to Europe, in 1752, he was appointed president of the naval academy at Cadiz, where he rendered valuable service during the earthquake of Lisbon. His principal works include: *Histoire de l'Académie des Sciences 1680 à '99* (1728); *El temblor de tierra de Lima, sus causas, efectos y consecuencias* (1748); *Observations astronomiques au Pérou* (1752); *Des tremblements de terre en général, de ceux de Lima et Lisbon en particulier* (1753); *Les possessions espagnoles de l'Amérique du Sud* (1755).

**GODIN DES ODOIS, dâ zô'dô'nâ', JEAN** (1712-92). A French naturalist, born at Saint-Amand, France. Early in his life he went to Peru, where he was appointed to the chair of natural science and astronomy at Quito (1739). Several years later he began a botanical exploration of northern Peru and Ecuador, and afterward removed to Cayenne, where from 1750 to 1765 he explored the neighboring country and Brazilian Guiana. From here he traveled along the Amazon, on the banks of which he made further botanical investigations during a period extending over eight years. On these journeys he prepared illustrations of hundreds of mammals and birds, many of them before unknown, and collected more than 10,000 species of plants. Returning to France in 1773, he gave his collections to the Museum of Natural History at Paris. His numerous publications, comprising works on the botany and languages of South America, include: *Flore raisonnée du Pérou* (1776), containing more than 4000 species, with two volumes of illustrations, in more than 700 plates; *Les plantes de la Guayane* (1777); *Faune du Pérou* (1778), with numerous illustrations; *Flore de la Guayane* (1779), with three volumes of illustrations; *Grammaire comparée des langues indiennes de l'Amérique du Sud* (1784).

**GÖDING, gë'ding** (Bohemian *Hodonin*). A town in Moravia, Austria, on the right bank of the navigable March, which here forms part of the Hungarian boundary, about 70 miles north-east of Vienna. It is in a good agricultural district. The principal attraction is the Imperial castle, with its immense park. It has German and Czech high schools, cavalry barracks, a state horse depot, a tobacco factory, sugar refineries, a spirit distillery, a brewery, and several saw mills. Pop., 1900, 10,231.

**GODIVA, or GOD/GIFU** (?-c.1080). According to legend, a Saxon lady of Coventry, in Warwickshire, who rode naked through the streets of the town out of devotion for her people. It is impossible to say whether the story is wholly fictitious or partly true. In its developed form the legend runs as follows: About the year 1040, Leofric, Earl of Mercia and Lord of Coventry, imposed certain onerous services and heavy exactions upon the inhabitants of the latter, of which they loudly complained. His wife, the Lady Godiva, having the welfare of the town at heart, besought her husband to give them re-

lief, and was so earnest in her entreaties that at length, to escape from her importunities, the Earl said he would grant her the favor, but only on condition that she would ride naked through the town, supposing, from the modesty of Lady Godiva, that he had imposed an impossible condition. He was surprised with her answer: "But will you give me leave to do so?" As he could not in justice refuse, she ordered that proclamation be made that on a certain day no one should be out of doors, or even look from their houses; and, clothed only in her long hair, she rode through the town. Her husband, in admiration of her intrepid devotion, performed his promise. This circumstance was commemorated by a stained-glass window, mentioned in 1690, in St. Michael's Church, Coventry; and the legend that an unfortunate tailor, the only man who looked out of a window, was struck blind, has also found commemoration in an ancient effigy of "Peeping Tom of Coventry," probably an image of St. George, still to be seen in a niche of one of the buildings. By a charter of Henry III (1218), a fair is held at Coventry, beginning on Friday of Trinity week, and lasting eight days. The fair was formerly opened with a grand civic procession, a part of which was, in 1678, the representation of the ride of Lady Godiva. These processions were continued at intervals of from three to seven years until 1826. Some beautiful woman, who represented Lady Godiva, was the principal figure; but many other historical and emblematic personages were introduced. In 1848 the procession was revived with great splendor, and attracted 15,000 strangers. The ceremony has, however, fallen into disrepute, the last procession occurring in 1887. For a full discussion of the legend, consult Freeman, *The Norman Conquest* (Oxford, 1870-79); consult also Poole, *Coventry, its History and Antiquities* (London, 1870), and Harris, *Story of Coventry* (ib., 1911).

**GODKIN, EDWIN LAWRENCE** (1831-1902). An American editor and publicist, born in Moyne, County Wicklow, Ireland, son of a Presbyterian minister who was also a journalist and a leader in the "Young Ireland" movement. The son graduated at Queen's College, Belfast, in 1851, and during the Crimean War (1854-56) was special correspondent of the *London Daily News*. In 1856 he came to the United States, and traveled in the South. In 1857 he settled in New York City, where he read law under David D. Field (q.v.), was admitted to the bar in 1858, and for several years practiced occasionally. From 1862 until 1865 he was a correspondent of the *Daily News* and an editorial writer for the *New York Times*. In 1865 he established and became editor of the *Nation*, a weekly fashioned after the London *Spectator*, whose proprietorship was assumed in 1866 by himself, J. M. McKim, and F. L. Olmsted (q.v.). In 1881 the *Nation* was merged with the *Evening Post*, of which it became the weekly edition, and Godkin was thereafter an editor (in 1883-99 editor in chief) and proprietor of the combined publications. As a journalist, he devoted little attention to the organization of newspaper service, but he was one of the foremost leader writers in the history of the American press. His editorials in the *Nation* influenced in manifold ways the best thought of the time, and from 1884, previous to which the paper had been avowedly Republican, he made the *Evening Post* the leading independent American daily. His



style was noteworthy for its directness, its pith, and (to quote Henry James) "admirably aggressive and ironic editorial humor, of a quality and authority new in the air of a journalism that had meant for the most part the heavy hand alone." Godkin's critical estimates were singularly acute and mainly just, but possibly too purely intellectual to be often sympathetic. He was a prominent figure in reforms affecting the causes of sound money, of reconstruction, and of the civil service. In him the idea of public office as a public trust had undoubtedly its chief exponent in the United States. He consistently and severely opposed the "spoils" or close party system in American politics, as well as "boss" or "machine" rule in various forms. His fearlessness often exposed him to disapproval, and not seldom to abuse. In preparation for the New York City municipal campaign of 1890, he printed in the *Post*, with scathing editorial comment, a series of biographies of Tammany Hall leaders, which resulted in the issuance against him of several warrants of arrest on charges of criminal libel. The cases were dismissed for lack of prosecution. He received the degree of D.C.L. from Oxford University in 1897. A memorial Godkin lectureship at Harvard upon "The Essentials of Free Government and the Duties of the Citizen" was founded in 1903. He published a *History of Hungary, A.D. 300-1850* (1853; 2d ed., 1856); an excellent work on *Government* (1871), in the "American Science Series"; and *Reflections and Comments* (1895), *Problems of Modern Democracy* (1896), and *Unforeseen Tendencies of Democracy* (1898)—all valuable collections of papers respectively from the *Nation*, the *Atlantic*, and other sources. Consult Ogden, *Life and Letters of E. L. Godkin* (New York, 1907).

**GODLEY, ALFRED DENIS** (1856- ). A British educator, born in County Leitrim, Ireland, and educated at Harrow and at Balliol College, Oxford. He was assistant master at Bradfield College in 1879-82 and fellow and tutor of Magdalen College in 1883-1912, and in 1910 became public orator of the university. A remarkably clever writer of light verse, he contributed some brilliant parodies to the *Oxford Magazine*; edited, with Prof. Robinson Ellis, the *Nova Anthologia Owoniensis* (1899); published an edition of Tacitus' *Historiae* (1887 and 1890) and a translation of Horace's *Odes* (1898); and wrote *Verses to Order* (1892 and 1903), *Aspects of Modern Oxford* (1893), *Socrates and Athenian Society* (1895), *Lyra Frivola* (1899), *Second Strings* (1902), *Oxford in the Eighteenth Century* (1908), *The Casual Ward* (1912); and "Senecan Tragedy," in *English Literature and the Classics* (Oxford, 1914).

**GODMAN, JOHN D.** (1794-1830). An American physician, born in Annapolis, Md. He graduated at the University of Maryland in 1818, was professor of anatomy in the Medical College of Ohio, was one of the editors of the *Philadelphia Journal of Medical Science*, and in 1826-27 was professor of anatomy and physiology in Rutgers Medical College in New York. He was the author of many articles in the *Encyclopædia Americana*, and in addition published: *American Natural History; Anatomical Investigation* (1824); and *Rambles of a Naturalist*.

**GODODIN.** A seventh-century epic by the Welsh bard Aneurin, who was the son of the chief of the Gododin tribe, founded on the week's battle of Cattereth (603). It is about 900 lines

in length, and in 1852 was translated by Rev. John Williams, at Ithel. John Morley has also translated parts of it, and the poet Gray founded his "Death of Hoel" upon it. Consult Elton, *Origins of English History* (London, 1882).

**GÖDÖLLÖ, gē'dē-lē.** A market town in Hungary, about 16 miles northeast of Budapest. It is chiefly noteworthy for its royal château of more than 100 rooms, with an extensive park, formerly the property of the Princes Grassalkovich, later of Baron Sina, but purchased in 1867 by the Hungarian nation and presented to the King at his coronation. It is now the royal summer residence; yearly the court holds a great hunt here. In the vicinity is Besnyő, a noteworthy pilgrims' resort. It has a school of hand weaving. Pop., 1900, 5893. At Gödöllő, April 6-7, 1849, the Hungarians under Görgey defeated the Austrians under Windischgrätz. The victory led to the proclamation of Hungarian independence, April 14, 1849. Consult Ripka, *Gödöllő* (Vienna, 1898).

**GODOLPHIN, SIDNEY**, first EARL OF (1645-1712). An English statesman. The third son of Sir Francis Godolphin, he was born at Helston, Cornwall, but of his youth little is known. In 1662 he was page of honor to Charles II, and in 1678 he became Master of the Robes. From 1668 to 1679 he was a member of Parliament for Helston, then two years for St. Mawes. In 1678 he was one of the commissioners sent to Holland to negotiate the Peace of Nimeguen. Next year the government appointed him Lord of the Treasury. In 1684 he was made First Commissioner of the Treasury and created a peer, with the title of Lord Godolphin of Rialton. Although his dislike of Roman Catholicism led him to vote for the exclusion of the Duke of York from the succession, on the Duke's accession as James II, Godolphin became chamberlain to the Queen; in 1686 he was again Commissioner of the Treasury; and afterward the King gave him a place on the commission sent to treat with William of Orange. In 1690 William appointed him First Lord of the Treasury, and five years afterward one of the seven lords justices for the administration of government during the King's absence. As Godolphin was guilty of secret correspondence with James II at Saint-Germain, he resigned his office in trepidation upon Sir John Fenwick's confession. When Fenwick was beheaded and his story discredited, however, Godolphin again became Lord of the Treasury (1700). Appointed Lord Treasurer on the accession of Anne (1702), he remained head of the home government during eight years, mainly through the influence of the Duke of Marlborough, whom Godolphin stanchly supported with funds for the prosecution of the Duke's wars. In 1706 Godolphin was created Earl of Godolphin and Viscount Rialton. His position as head of the Whig government came to an end in 1710, when he fell from power and was supplanted by Harley. He died at St. Albans, Sept. 15, 1712. A man of remarkable intelligence and of business-like habits, he was thorough in everything he did, and in an age of corruption he kept his hands pure. Consult: Elliot, *Life of Sidney, Earl of Godolphin* (London, 1888), very favorable; Collins, *Peerage* (9 vols., ib., 1812); Evelyn, *Diary* (4 vols., ib., 1879); Clarke, *Life of James II* (2 vols., ib., 1816); Macpherson, *Original Papers* (2 vols., ib., 1775); Burnet, *History of my Own Time*



(Oxford, 1833); and Walpole, *Essays Political and Biographical* (London, 1908).

**GODOLPHIN BARB**, THE. See BARB.

**GODON**, SYLVANUS WILLIAM (1809-79). An American naval officer. He was born in Philadelphia; entered the navy as a midshipman in 1819; served in the Mexican War; and, in command of the *Mohican*, took part in the attack on Port Royal in 1861. In 1863 he became commodore, and in the attacks on Fort Fisher (q.v.) commanded a division of Admiral Porter's fleet. He was made rear admiral at the close of the war; commanded the South Atlantic squadron in 1866-67; was commandant of the Brooklyn Navy Yard in 1868-70; and was retired in 1871.

**GODOWN'** (Malay *godong*, *godong*, warehouse). A term applied in the East Indies and in most of the Orient to a storehouse or building located on or near a wharf and chiefly used for the storage of goods. The term is believed by some to be a modification of a Dutch word indicating storehouse; by others it is believed to have come into use from the circumstance that most of the storehouses in the East Indies were formerly below the surface of the ground.

**GODOWSKI**, gô-dôv'skê, LEOPOLD (1870-). A Polish-American pianist. He was born at Vilna, in Russian Poland, and received his first instruction from local teachers. From 1881 to 1884 he was student at the High School of Music, Berlin, coming from there to America on an extended concert tour (1884-85). From 1886 to 1890 he studied with Saint-Saëns in Paris. During the next two years he made his second tour of America. From 1895 to 1900 he was director of the pianoforte department of the Chicago Conservatory. In 1900 he resumed playing again in Europe, meeting everywhere with extraordinary success. When he was appointed director of the *Klaviermeisterschule* at Vienna in 1909 he settled definitely in the Austrian capital, but continued at the same time his extended concert tours. During the seasons of 1912, 1913, and 1914 he visited the United States again. The most conspicuous quality in his playing is a dazzling, fabulous technique, while he is lacking in soulfulness and poetic conception. His numerous paraphrases of works by Chopin, Weber, Henselt, and J. Strauss make extraordinary demands upon the player's technical execution. His original compositions consist of a sonata in E minor, 24 pieces published under the title *Renaissances*, and 24 others entitled *Walzermasken*.

**GODOY**, gô-dô'ê, MANUEL DE, DUKE OF ALUCUDIA (1767-1851). A Spanish statesman. He was born at Badajoz, of a noble family in straitened circumstances. At the age of 17 he entered the King's bodyguard at Madrid, where his personal attractions gained him the favor of Charles IV, and of his Queen, Maria Luisa. Honors and titles were heaped upon him and he became, in 1791, lieutenant general and grandee of Spain, with the title of Duke of Alucudia. The next year he was made Prime Minister, and, failing to save the life of Louis XV, he declared war against the French Republic, which resulted disastrously for Spain. To secure peace Godoy negotiated the Treaty of Basel, for which he was severely criticized, though the King rewarded him with the title of the Prince of the Peace. In 1797 he was removed from the office of Minister, retaining all his honors and emoluments and continuing to exercise a dominating power in Spanish politics.

Returning to power in 1801, he entered into an alliance with France against Portugal, and invaded the latter country in command of the allied forces. The brief "War of the Oranges" was ended by the Treaty of Badajoz, by which Portugal closed her ports to England and ceded Olivenza and its territory to Spain. As a reward for this exploit Godoy was made generalissimo of the Spanish forces on land and sea. The ill success of the war against England, culminating in the defeat of Trafalgar, stirred up great popular hatred for Godoy, while his sudden elevation incited the hostility of the envious nobles. The Crown Prince Ferdinand placed himself at the head of a court faction, and Godoy's attempt to stir up the King against the Prince only served to excite popular feeling. When Godoy, upon the invasion of Spain by the French troops in 1808, prepared to escape with the King and the Queen to Mexico, an insurrection broke out at Aranjuez. The King was forced to imprison the hated Minister to save his life from the mob. Napoleon, who wished to make use of Godoy in his raid on the Spanish crown, summoned him to Bayonne, where he signed Charles's act of abdication in favor of his son Ferdinand. (See CHARLES IV; FERDINAND VII.) The latter part of his life was spent at Rome and, after 1830, in Paris. Reduced to straitened circumstances for a long time, he received back part of his confiscated property in 1847, together with his titles. He died in Paris, Oct. 7, 1851. His *Memorias Críticas apologéticas para la historia del reinado del Señor don Carlos IV de Bourbon* were published in English (London, 1836) and in French by Esménard (Paris, 1836). Consult Ovila y Otera, *Vida política y militar de D. M. Godoy* (Madrid, 1844), and D'Auvergne, *Godoy, the Queen's Favorite* (Boston, 1913).

**GOD SAVE THE KING** (or QUEEN).

The national anthem of Great Britain, of which the music by adoption is that of several of the German states. It is played and sung in every part of the British Empire alike on solemn and festive occasions. Its origin has long been a subject of controversy. The contentions that it is of French or Scottish origin have been disproved, and according to Chrysander (*Jahrbucher I*, 287-407) it is almost certain that Henry Carey (q.v.) is the author of the hymn as we know it to-day. He is credited with having composed both words and music about 1740, though he never claimed the song as his, and though none of his friends put forward such a claim until his son, some fifty years later, petitioned the government for a pension on the ground that his father had written the hymn. The evidence which he adduced in support of this was purely circumstantial, and the petition was refused. On the contrary, there are traces of the existence of the song, or a similar one, long before Carey's time. A Latin hymn, "O Deus Optime," which still exists, and whose words are a counterpart of the present hymn, was sung in 1740. As for the music, John Bull (c.1563-1628) wrote an "ayre," still existing, which is identical in rhythm and similar in melody to "God Save the King." The hypothesis, backed by considerable circumstantial evidence, is that the above Latin words, or their prototypes, were written in 1688, and set to Bull's "ayre" by their author. There is record of such a hymn having been sung in King James's Chapel. The song would naturally be preserved by the Stu-

arts, and the music, passing through various popular transformations, would ultimately reach its present form. It will be seen that this theory does not preclude Carey from having translated the words and given the final shape to the music.

The words and music were first published anonymously in the *Harmonia Anglicana* (1742), and appeared in the *Gentleman's Magazine* (1745). It has been chosen for a national air in Prussia, where it is sung to the words *Heil dir im Siegerkranz*, and it was sung in Russia until the new anthem was written in 1833. In the United States it has long been known as the air to which "My Country, 'Tis of Thee" is sung. Consult: Bateman, "The National Anthem," in the *Gentleman's Magazine*, vol. cclxxv (London, 1893), and Hadden, "The 'God Save the Queen' Myths," in *Argosy*, vol. lxxii (ib., 1900); Cummings, *God Save the King* (ib., 1902); also Chappell, *Collection of National Airs* (ib., 1838-40). See NATIONAL HYMNS.

**GOD'S FOOL.** A novel by Maarten Maartens (1892), considered by the author his masterpiece. The fool, Elias Lossel, by accident in childhood became blind, deaf, and obscured in mind. In spite of all he had a sweet and loving nature. Handsome and wealthy, he was at last the victim of his half brother's greed. The story gives a realistic picture of life in a small Dutch city.

**GOD'S TRUCE.** See TRUCE OF GOD.

**GODTHAAB**, gó'tháb (Dan., good hope). A town and harbor of Greenland, on the west coast, the capital of the Danish Southern Inspectorate and the residence of the Danish Inspector (Map: America, North, N 3). It was founded by Hans Egede in 1721 and is the oldest colony in Greenland. Pop., of the district, about 1000, of whom less than 20 are Danes. Of these about 150 are at Godthaab and 110 at Ny (New) Hernnhut, near by, the former headquarters of the Moravian missionaries.

**GOD TREE.** See CEDAR.

**GODUNOV**, gó'du-nóf, BORIS (c.1551-1605). A czar of Russia. He became to all intents Regent during the reign of Feodor I (1584-98). In 1591 he is said to have caused the murder of the Czarevitch Demetrius, and in 1598, upon Feodor's death, was elected to the throne. In 1595 he recovered the territory previously lost to Sweden. He had previously (1591) defeated the Khan of the Crimean Tatars. While Regent, he recolonized Siberia, placed the Muscovite church on an equal footing with the other Eastern churches, and forbade (by the famous *ukaz* of 1587) the transfer of peasants from one landowner to another—an edict of far-reaching consequences. As Czar, he appears to have been in the main element and progressive. But the favor shown by him to foreigners and numerous innovations introduced by him resulted in considerable popular discontent. Thus, southern Russia was prepared to revolt to the standard of the first false Demetrius in 1604. Godunov's history has been utilized by Pushkin in a drama of the name, for a German rendering of which consult Von Bodenstedt's translation of the complete works of that author (vol. iii, Berlin, 1855). It has also inspired a charming opera by the Russian composer, Moussorgsky (q.v.).

**GODWIN**, or **GODWINE** (?-1053). An earl of the West Saxons. Nothing is known definitely of him until 1018, when he is described as *dux*, or earl. About 1020 he was Canute's most powerful official. More than any

other person he contributed to the elevation of Edward the Confessor to the English throne, and from that time Godwin was the head of the national party, as opposed to the Norman court favorites. He was Earl of Wessex and enormously wealthy; his son Swegen was Earl of Hereford, Gloucester, and Oxford; his son Harold was Earl of East Anglia; his wife's nephew, Beorn, was Earl of Hertfordshire and Buckinghamshire; and his daughter Edith was Edward's Queen. As the Norman party became powerful, Godwin's influence over the King declined. The crimes of his son Swegen, who was outlawed for the seduction of an abbess and the murder of his cousin Beorn, weakened his position. Finally, in 1051, when Godwin refused to obey the orders of Edward, to punish the citizens of Dover on account of complaints of ill treatment made by the Normans, he lost the King's favor, was outlawed, and fled to Flanders. Godwin attempted to treat with the King, but, finding this of no avail, resorted to violence, encouraged in this by the promises of support extended him everywhere in England. In September, 1052, he sailed up the Thames with a strong fleet and was enthusiastically received by the people. The King yielded and on September 15 restored to him and his family all his property which had been confiscated. Soon after Godwin became ill, and died, April 14, 1053. Consult Freeman, *The Norman Conquest*, vols. i and ii (Oxford, 1870-79), for a favorable view of Godwin, and Green, *The Conquest of England* (London, 1883), for a rather unfavorable estimate. Consult also Hodgkin, *History of England from Earliest Time to Norman Conquest* (London, 1906), and Oman, *England before the Norman Conquest* (New York, 1910- ).

**GODWIN, FRANCIS** (1562-1633). An English Bishop and author, born at Hannington, Northamptonshire. He studied at Christ Church, Oxford, graduating in 1580, took orders, and became rector of Sampford, and afterward vicar of Weston-in-Zoyland and subdean of Exeter (1596). His *Catalogue of the Bishops of England* (1601) attracted the attention of Queen Elizabeth, who made him Bishop of Llandaff. In 1617 he was transferred to the see of Hereford by James I. He revised his *Catalogue* several times (1615 and 1616) and also wrote *Rerum Anglicarum Annales* (1616; Eng. version by his son, 1630). The best known of his works is *The Man in the Moon, or a Discourse of a Voyage Thither by Domingo Gonsales, the Speedy Messenger* (1638). It is supposed to have influenced Cyrano de Bergerac's *Voyage to the Moon*, as it was translated into French by J. Baudoin (1648), and traces of it seem to appear in parts of *Gulliver's Travels*.

**GODWIN, MARY WOLLSTONECRAFT** (1759-97). An English miscellaneous writer. She was born at Hoxton, near London, April 27, 1759, and was of Irish descent. Her mother died in 1780, and, owing to the brutality of her father, Mary and her sisters were compelled to leave his house. Mary earned her living as school-teacher and governess until 1788, when she settled in London and was employed by Johnson the publisher as reader and translator. While at Paris in 1792 she met Gilbert Imlay, an American merchant and author. After bearing to him a daughter she was deserted. On March 29, 1797, she married William Godwin, and became the mother of Mary, the future Mrs. Shelley. She

died Sept. 10, 1797. The outline of her career contributed to the plot of Mrs. Amelia Opie's *Adeline Mowbray* (1804). Mrs. Godwin was one of the "advanced women" of her time. Her most notable work is *Vindication of the Rights of Women* (1792), a conspicuous landmark in the history of feminism, which has anticipated the claims for greater freedom, personal, social, and political, that are the marks of the woman's movement of a century later. In it she attacked Rousseau's ideal woman, the heroine of novels and boarding schools. She advocated the establishment of government day schools and maintained the right of women to enter the professions and politics. In short, her thesis was the equality of the sexes. Among her other works are: *Thoughts on the Education of Daughters* (1787); *Original Stories from Real Life* (1788); *Vindication of the Rights of Men*, a letter to Burke (1790); *Posthumous Works*, containing "Wrongs of Women," fragment of a novel, and "Letters and Miscellaneous Pieces" (4 vols., 1798). Consult: Godwin, *Memoirs of the Author of a Vindication of the Rights of Women* (London, 1798); Paul, *Mary Wollstonecraft: Letters to Inlay*, with memoir (ib., 1879; and a good later edition, New York, 1908); Pennell, *Life of Mary Wollstonecraft* (Boston, 1884); E. Rauschenbusch-Clough, *Study of Mary Wollstonecraft and the Rights of Woman* (New York, 1898); G. R. S. Taylor, *Mary Wollstonecraft* (ib., 1911); W. Godwin, *Elopement of Percy Bysshe Shelley and Mary Wollstonecraft Godwin* (privately printed, St. Louis, Mo., 1912), with commentary by H. B. Forman.

**GODWIN, PARKE** (1816-1904). An American journalist and author. He was born in Paterson, N. J., Feb. 25, 1816, and after graduating at Princeton, in 1834, practiced law for a short time in Kentucky, but after 1837 was for many years in the main connected with the New York *Evening Post*, of which the poet Bryant, his father-in-law, was for so long chief editor. Godwin conducted in 1842 a weekly, the *Pathfinder*, contributed much to the *Democratic Review*, was one of the editors of *Putnam's Magazine*, deputy collector in the New York Custom House under President Polk, and an early member of the Republican party, though a consistent advocate of free trade. Two volumes of essays from *Putnam's Magazine* are gathered in *Out of the Past* (1870). Among his numerous other publications may be mentioned: *A Popular View of the Doctrine of Fourier* (1844); *Democracy, Civic and Constructive* (1844); *Vala: A Mythological Tale* (1851); *Political Essays* (1856). Godwin compiled a *Handbook of Universal Biography* (1851) and *Cyclopaedia of Biography* (1863). He edited the *Works of W. C. Bryant*, with a *Life* (4 vols., 1884), and made translations from the prose of Goethe, Fouqué, and Zschokke. He also wrote an ingenious but rather erratic *New Study of Shakespeare's Sonnets* (1900).

**GODWIN, THOMAS** (1587-1642). A Church of England scholar. He was born at Wookey, Somersetshire; educated at Oxford; was rector of Brightwell, Berkshire, and died there March 20, 1642. He is remembered for his English treatise on Roman antiquities, with the Latin title *Romanæ Historiæ Anthologia* (1614); and *Moses and Aaron, or Civil and Ecclesiastical Rites Used by the Ancient Hebrews* (1625).

**GODWIN, WILLIAM** (1756-1836). An Eng-

lish novelist and political writer. The son of a dissenting minister, he was born at Wisbeach, Cambridgeshire, March 3, 1756. After studying at the Hoxton Presbyterian College, he became minister at Ware in Hertfordshire and in 1780 minister at Stowmarket in Suffolk. Having been shaken in his religious belief, he gave up preaching in 1783 and by 1787 he was "a complete unbeliever." He was already devoting himself to literature. After a *Life of Chatham* (1783), *Sketches of History, in Six Sermons* (1784), and considerable hackwork, he published the famous *Enquiry Concerning Political Justice* (1793), in which were presented the most radical theories of French philosophy on morals and government. By this book he is best known. It was followed by *The Adventures of Caleb Williams* (1794), a remarkable novel, intended to illustrate the political views advanced in the *Political Justice* and by *The Enquirer* (1797), a collection of essays on morals and politics. In 1796 he formed an alliance with Mary Wollstonecraft (q.v.). After some months they yielded so far to custom as to be married. His wife died a short time after, in giving birth to a daughter, the future wife of the poet Shelley. In 1799 he published a successful romance entitled *Saint Leon*. In 1801 he married a Mrs. Clairmont. To secure a more certain support, Godwin and his wife started in 1805 a small publishing business, which, however, failed in 1820; but he also worked indefatigably with his pen to the end of his life. He wrote many school books; *Life of Chaucer* (1803); *Fleetwood*, a novel (1805); *Mandeville*, a novel (1817); *Of Population* (1820), a reply to Malthus; *History of the Commonwealth of England* (1824-28); *Cloudsley*, a novel (1830); *Thoughts on Man* (1831); *Deloraine*, a novel (1833); and *Lives of the Necromancers* (1834). As he grew old, he modified his opinions on politics and society, and especially on marriage, which he warmly commends in some of his later works. Many of his books were translated into foreign languages. He died in London, April 7, 1836. Consult: Paul, *William Godwin: His Friends and Contemporaries* (London, 1876); Hazlitt, essay in *The Spirit of the Age* (ib., 1825); Stephen, *English Thought in the Eighteenth Century* (ib., 1876). See GODWIN, MARY WOLLSTONECRAFT.

**GODWIN-AUSTEN**, göd'win-as'ten. One of the highest mountain peaks in the world, exceeded probably by Mount Everest only, situated in the Mustagh Range of northern Kashmir (Map: India, C 1). It was named after Lieutenant Colonel Henry H. Godwin-Austen (q.v.). Its altitude is placed at 28,265 feet. It is also called K 2.

**GODWIN-AUSTEN, HENRY HAVERSHAM** (1834- ). An English topographer and geologist and one of the pioneers of scientific geography. He was born at Teignmouth, the son of Robert A. C. Godwin-Austen; was educated at the Royal Military College, Sandhurst; obtained a commission in the Twenty-fourth Regiment of Foot in 1851 and joined it in India in the following year. He served with distinction in the Second Burmese War and after its close became an assistant topographer in the East Indian Trigonometrical Survey. In 1857 he was connected with the Government Survey in Kashmir, where he made the discovery of the important Baltoro glacier at the head of the Shigar River. In 1862-63 he conducted surveys in

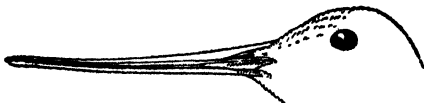
Ladakh, making 13 ascents of mountain peaks, among them that of Mata, 20,607 feet high. He served in the Bhutan campaign in 1874 and took part in the expedition against the Daffas in the eastern Himalayas. He retired from the army in 1877 with the rank of lieutenant colonel. He was elected a fellow of the Royal Geographical Society, in 1910 was presented the Founder's medal for his work in exploration, and Mt. Godwin-Austen (q.v.) was named for him. His writings include numerous important articles and monographs for various scientific magazines and society reports. His works include: *On the Land and Fresh Water Mollusca of India* (1882-99), a monumental work in 11 parts, and *The Fauna of British India*, vol. *Mollusca* (1908).

**GODWIN-AUSTEN, ROBERT ALFRED CLOYNE** (1808-84). An English geologist, born near Guildford, the son of Sir H. E. Austen. He was educated at Midhurst School, at a military college in France, and at Oxford, where, after graduation, he was elected a fellow of Oriel College. Here he studied geology under William Buckland. In 1833 he married a daughter of Gen. H. T. Godwin, upon whose death in 1854 he prefixed, by royal license, the name of Godwin to his own. His geological studies and discoveries, covering a period of more than half a century, were extensive and valuable, and his contributions to geological literature were considered authoritative, particularly the result of his investigations in Devonshire. He edited, as literary executor, the *Memoir on the Pluvio-marine Tertiaries of the Isle of Wight* (1856), left by Edward Forbes in manuscript, and completed the *Natural History of the European Seas* (1859), begun by the same author. In addition to these he wrote numerous original articles and notes in various geological journals. He was made a fellow of the Geological Society of London in 1830, a fellow of the Royal Society in 1849, and was twice president of the Geological Section of the British Association.

**GODWINE.** See GODWIN.

**GODWIN'S OATH.** A proverbial expression for a false oath, originating in the story that Godwin, Earl of Kent, was choked to death by a piece of bread while calling Heaven to witness his innocence of the murder of Alfred, the brother of Edward the Confessor.

**GODWIT** (of doubtful etymology, possibly from AS. *gōd*, good + *wit*, wit; hardly from *gōd*, good + *wiht*, wight, creature, or from *god*, God + *wit*, wit, or *wiht*, wight, creature). A genus (*Limosa*) of large curlew-like shore birds of the snipe family (Scolopacidae), with very long bill, slightly curved upward, and long slender legs. All the species frequent marshes and shallow waters, often those of the seacoast, where they seek their food by wading and plung-



BILL OF MARBLED GODWIT.

ing the long bill into the water or mud like snipes. They sometimes also run after small crustaceans or other animals and catch them in the sands from which the tide has retired. All are noted for their loud, yelping cries. Two species are confined to North America—the great

marbled godwit (*Limosa fedoa*) and the Hudsonian godwit (*Limosa hemastica*). Neither is very numerous, and both are visible only when passing back and forth from their northern breeding haunts to their tropical winter homes, the marbled godwit, however, nests in Iowa and northward. The general hue of these birds is rufous or cinnamon, the marbled godwit being paler than the Hudsonian, but both vary greatly with age, sex, and season; the former has the reddish tail barred with black and without any white, while the latter has a black tail broadly white at the base. The females are uniformly larger than the males. Godwits build their nests anywhere on the ground, not necessarily near water, and lay three and four eggs, olive drab spotted with umber brown. Four or five other species of godwit are found in the Old World. The flesh of all is good, and in Elizabethan England it was regarded as an expensive delicacy, often celebrated in the prose and verse of the period. The incessant pursuit of this bird, particularly by netting on the fens, nearly exterminated it in Great Britain. It is taken by gunners whenever encountered, but is not much sought after nor especially valued either for sport or food. See Colored Plate of SHORE BIRDS.

**GOEBEL, göbel, JULIUS** (1857- ). An American Germanic scholar, born at Frankfurt-on-the-Main, Germany. He was educated at the universities of Leipzig and Tübingen (Ph.D., 1882). He came to the United States in 1882; was instructor in German at Johns Hopkins University (1885-88), professor of Germanic philology and literature at Leland Stanford (1892-1905), and lecturer on Germanic philology at Harvard (1905-08), and became professor of Germanic languages at the University of Illinois in 1908. He was editor of the *Belletristisches Journal* in 1888-92 and of the *Journal of English and German Philology* after 1909; edited Goethe's *Poems* (1901), Schiller's *Poems* (1903), Goethe's *Faust* (1907), *German Classics* (1909), *Year Book of the German American Historical Society* (1913), *Germanic Literature and Culture* (1913); and wrote *Ueber die Zukunft unseres Volkes in Amerika* (1883); *Ueber tragische Schuld und Sühne* (1884); *Gedichte* (1895); *Das Deutschtum in den Vereinigten Staaten* (1904).

**GOEBEL, geb'el, KARL, RITTER VON** (1855- ). A German botanist, born in Bietigheim, Baden, and educated at Tübingen, Strassburg, and Würzburg. He became professor of botany at Rostock (1882), at Marburg (1887), and at Munich (1891), where he was director of the New Botanical Gardens. He traveled in India, Ceylon, and Java in 1885-86, in Venezuela in 1890-91, and in Australia in 1898-99. Goebel received honorary degrees from Cambridge, Geneva, and St. Andrews, and was knighted in 1909. Among his important works are: *Grundzüge der Systematik und der speziellen Pflanzen-Morphologie* (1882; in English, by Garnsey, 1887); *Vergleichende Entwicklungs-geschichte* (1883); *Pflanzenbiologische Schilderungen* (1893); *Organographie der Pflanzen* (1898-1901; 2d ed., 1913; in English, by Bayley Bal-four); *Einleitung in die experimentelle Morphologie* (1908).

**GOEBEL, göbel, WILLIAM** (1856-1900). An American politician, born in Sullivan Co., Pa. He removed to Covington, Ky., in early boyhood, studied law, was admitted to the bar, and won

a reputation as a trial lawyer, and as a political speaker and leader in the Democratic party. In 1887 he was elected to the Kentucky State Senate, to which body he continued to be re-elected at every election up to and including 1898. He built up a strong political machine. One of his personal quarrels culminated in his shooting and killing Col. John D. Sandford, for which he was acquitted on the grounds of self-defense. In 1897 he secured the passage of the "Goebel law," relieving the courts of all power in the appointment of election officials, and creating a State election commission of three members, chosen by the Legislature, which should have the power to appoint local boards on the same principle. This act was intended to assure Democratic ascendancy. It was passed over the veto of Governor Bradley (Republican), and was held constitutional by the State Supreme Court in December, 1898. In June, 1899, Goebel was nominated for Governor by the Democratic party. Seceding Democrats nominated John Young Brown, and W. S. Taylor, the Republican candidate, was elected by about 2300 votes. Goebel contested the election, and a legislative committee was about to report in Goebel's favor, when, on January 30, he was shot in front of the State Capitol by an assassin concealed in a neighboring building. The Democratic members of the Legislature immediately declared him Governor, and the oath of office was administered to him on January 31. He died on February 3. Consult *My Own Story* (Indianapolis, 1905), by Caleb Powers, Republican nominee for Secretary of State, convicted of complicity in the murder of Goebel.

**GOEBEN**, gē'ben, AUGUST VON (1816-80). A German soldier. He was born at Stade in Hanover, entered the Prussian military service at the age of 17, but in 1836 went to Spain as a partisan of Don Carlos, and took an active part in the fighting between 1836 and 1840, being repeatedly wounded and twice taken prisoner. After the end of the Carlist War he returned to Germany and wrote an account of his Spanish experiences, entitled *Vier Jahre in Spanien* (1841). Reentering the Prussian army, where he served on the staff, he took part in the campaign against the revolutionists in Baden in 1849, and became, in 1855, chief of staff of the Fourth Army Corps. In 1860 he was Prussian attaché with the army of the Spanish General O'Donnell in the campaign in Morocco. In 1864 he took a prominent part in the war against Denmark and became in the following year lieutenant general and commander of the Thirteenth Division. At the head of this division he first entered Hanover in the War of 1866 and then fought successfully at Kissingen and other places in Bavaria. In the Franco-German War, as commander of the Eighth Army Corps, he distinguished himself at Saarbrücken and Gravelotte and took part in the siege of Metz. In January, 1871, Goeben was appointed commander of the First Army Corps and fought a decisive battle at Saint-Quentin (January 19), when he defeated General Faidherbe and caused the disbanding of the French Army of the North. Besides the excellent account of his experiences in Spain, Goeben wrote valuable articles in military journals on the wars of 1866 and 1870-71. He was decorated with the Iron Cross and commanded at Coblenz until his death there, in 1880.

**GOEDEKE**, gē'de-ke, KARL (1814-87). A

German historian of literature. He was born at Celle and was educated at Göttingen, where he was professor from 1873 until his death. He was a remarkably prolific author and, after writing several novels and the drama *König Kodrus, eine Missgeburt der Zeit*, under the pseudonym of Karl Stahl, devoted himself to critical and biographical literature. The long list of his publications includes: *Deutschlands Dichter von 1813 bis 1843* (1844); *Elf Bucher deutscher Dichtung von Sebastian Brant bis auf die Gegenwart* (1849); *Deutsche Dichtung im Mittelalter* (2d ed., 1871); and the monumental *Grundriss zur Geschichte der deutschen Dichtung* (3d ed., under the editorship of Edmund Goetze, 1910 et seq.), his principal work. His biographies of Lessing, Goethe, and Schiller are well known. Consult Schreck, *Karl Goedeke* (1894).

**GOEHRE**, gē're, PAUL (1864- ). A German author and politician, born in Wurzen, Saxony, and educated at Leipzig and Berlin. He studied theology and was a Lutheran pastor at Schönbach, near Löbau, in 1888-90; then was a workman in Chemnitz; had charge of a church in Frankfort in 1894-97; and, after two years' work in the National Socialist party, in 1899 joined the Social Democrats. He was elected to the Reichstag in 1903, but resigned almost immediately, and was elected again in 1910. He wrote: *Drei Monate Fabrikarbeiter und Handwerksbursche* (1891), a great success, translated into English (1895), Norwegian, and Danish; *Die evangelische-soziale Bewegung* (1896; also translated into English; in 1891 he was general secretary of the Evangelical-Social Congress); *Wie ein Pfarrer Sozial-Demokrat wurde* (1900); *Die Kirche im 19. Jahrhundert* (1902); *Die Waarenhaus* (1907); *Der deutschen Arbeiter-Konsumverein* (1910); *Die sachsische Volksschule und ihre Reform* (1911).

**GOEJE**, gōō'ye, MICHAEL JAN DE. See DE GOEJE.

**GOEKINGK**, gē'kēpk, LEOPOLD FRIEDRICH GÜNTHER VON. See GÖCKINGK.

**GOERCKE**, gēr'ke, JOHANN (1750-1822). A German physician, born at Sorquitten, East Prussia. He entered the Prussian army as a surgeon at the age of 17 and in 1789 was appointed one of the three chief surgeons in the army. Meanwhile he had traveled extensively in Austria, Italy, France, and in England, where he entered into friendly relations with John and William Hunter, Bell, Cooper, Hamilton, and other equally celebrated surgeons. In 1797 he was appointed chief surgeon of the Prussian army, in which capacity he rendered invaluable services during the various campaigns terminating with the battle of Waterloo. He founded several educational institutions for military surgeons, the most important of which was the celebrated *Pépinière*, afterward known as the *Medicinisch-Chirurgisches Friedrich-Wilhelms-Institut*. His literary works include *Pharmacopœia Castrensis Borussia* (1805) and *Beschreibung der Krankentransportmittel bei der königlichpreussischen Armee* (1814).

**GOES**, gōōs, or **TERGOES**, tēr'gōōs. A seaport and market town of Holland, situated on the island of South Beveland, Province of Zeeland, about 3½ miles from its northern coast and 11 miles east of Middelburg (Map: Netherlands, B 3). The town has a fine Gothic church, a city hall, dating from 1442, with fine paintings, and the remains of an ancient castle of

Jacqueline of Bavaria. It has a harbor formed by a canal communicating with the East Scheldt, shipbuilding docks, and an active trade in hops, salt, and grain. It also has saw mills and establishments for bookbinding and cigar making. Pop., 1889, 6600; 1900, 6919; 1910, 7620.

**GOES, gô'ash, BENTO DE, or BENTO DE** (1562-1606). A Portuguese traveler and Jesuit priest. He was born on the island of San Miguel, one of the Azores, and until his twenty-sixth year led the life of an adventurer in the East Indies. In 1588 he entered the Order of Jesus and in 1603 was sent on a mission to the Great Mogul and thence to Cathay. At the court of the Emperor Akbar he acquired an extensive knowledge of the geography of Asia, ascertaining after his arrival at Suchau (1605), on the Chinese frontier, that Cathay and China were identical. His interesting notes and observations were published after his death by the Italian Jesuit missionary Matteo Ricci. Many translations into German, French, and English were also made, one of them entitled *The Report of a Mahometan Merchant which had been in Cambalu, and the Travels of Bento de Goes . . . from Lahor to China by Land* (1625).

**GOES, DAMIÃO DE** (1501-73). A Portuguese historian and diplomat, born at Alemquer (Estremadura). King John III of Portugal sent him on several important diplomatic missions to Flanders (1523), Poland (1529), Denmark and Sweden (1533). He then spent several years in Italy, engaged in philosophical and historical studies. At the siege of Louvain in Flanders by the French in 1542, Goes aided in the defense and saved the city from plunder, but was taken prisoner. He returned to Portugal in 1545 and three years afterward was placed in charge of the national archive, but his ideas were too advanced for the age. Suspected of Lutheranism, in 1572 he was condemned to imprisonment in the monastery at Batalha by the Inquisition and there died in obscurity. Among his works are: *Legatio Magni Imperatoris Presbyteri Joannis . . . de Indorum fide, ceremoniis, religione . . .* (1532); *Fides, religio, moresque Aetiopum sub imperio Pretiosi Joannis* (1541); *Commentarii Rerum Gestarum in India* (1539); *Hispania* (1542); *De Bello Cambratico Ultimo* (1549); *Chronica do felicissimo rei Dom Emmanuel* (1566-67); *Chronica do principe Dom Joam* (1567).

**GOES, gô'as, HUGO VAN DER.** See HUGO VAN DER GOES.

**GOES, JAN ANTONISZ** (Lat. form, JOANNES ANTONIDES) VAN DER (1647-84). A Dutch poet, born at Rotterdam. Owing to the success of his first efforts at poetic composition, he found a patron in a wealthy gentleman of Flushing, who paid for his education at Utrecht, where he studied medicine. Afterward he became a member of the Admiralty at Rotterdam. Goes was a poet of considerable power and may in many respects be regarded as the last of the Dutch classics. He was very precocious, and before the age of 25 eulogies had already been written in his honor by Kaspar Brandt, Vollenhove, Huygens, Oudaen, Vondel, and other distinguished authors. One of his best productions is *Ystroom* (1671). The poem entitled *Bellene aan Bant*, celebrating the peace between France and Holland, also occupies a high rank in Dutch literature. His collected poems appeared in 1685.

**GOES, gô'ash, PEDRO DE** (1503-54). A Portuguese pioneer, born in Lisbon. In 1580 he went

to Brazil with the expedition of Martim Affonso de Sousa and some years later was granted a strip of territory on the coast, where he first successfully introduced the cultivation of sugar cane. His plantation was subsequently destroyed by Indians, and Goes went to Portugal to secure the assistance of the King in suppressing the native uprisings. In 1548 he was appointed to assist the newly appointed Governor-General, Sousa, and, returning at once to Brazil, contributed greatly to the pacification of the country and the establishment of organized government. He is said to have been the first to bring specimens of the tobacco plant to Europe (1547).

**GOESSMANN, gēs'man, CHARLES ANTHONY** (1827-1910). An American chemist. He was born at Naumburg in Prussia and was educated at Göttingen, where he became assistant in the chemical laboratory and (1855) privatdocent. In 1857 he came to America, was chemist and superintendent of a Philadelphia sugar refinery until 1861, and then accepted a position with a Syracuse salt company. In 1869 he became professor of chemistry in the Massachusetts Agricultural College at Amherst, in 1873 chemist to the State Board of Agriculture, and in 1886 chemist to the State Board of Health. These three positions he held until his death. In 1887 he was president of the American Chemical Society. His writings include: *Chemical Composition of the Brines of Onondaga* (1862); *Best Mode of Manufacturing Coarse or Solar Salt from the Brines of Onondaga* (1863); *Salt Deposits of Petite Anse, La.* (1867); *Salt Resources of Goderich, Canada* (1868); *Manufacture of Sugar in Cuba* (1865).

**GOETHALS, gô'thalz, GEORGE WASHINGTON** (1858- ). An American military and civil engineer, engineer in chief of the Panama Canal, and first Civil Governor of the Panama Canal Zone. He was born in Brooklyn, N. Y., and after studying in the College of the City of New York entered the United States Military Academy. Graduating in 1880, he was appointed second lieutenant in the Corps of Engineers. Through successive promotions he reached the grade of colonel in 1909, further advancement being proposed for him in 1914. During the Spanish-American War he was lieutenant colonel and chief of engineers of United States Volunteers. From 1885 to 1887 he served as assistant professor of military engineering at West Point. His early river and harbor work included the construction of the Mussel Shoals locks and dams on the Tennessee River. He was made a member of the board of fortification and in 1903 a member of the general staff.

In 1907, President Roosevelt having decided that all bids for the construction of the Panama Canal be rejected, and that, instead of leaving the work in charge of a civilian commission, the government should undertake the construction directly, Colonel Goethals was appointed chairman, as well as chief engineer, of a new commission, composed on its technical side of army and navy officers. An able engineer, familiar with conditions attending the prosecution of government work, and a man of force and resources, strong in personality and able to inspire confidence and energy in others, Colonel Goethals straightway developed a system by which the excavation of the canal and the many allied problems could be handled efficiently and effectively. The army engineers soon had the

entire work of design and construction organized in harmony with the main general system, so that the actual construction could be undertaken at a rate not before realized—a rate which constantly improved with the progress of the work. Colonel Goethals, who regarded his work as that of an administrator rather than as that of an engineer, and who possessed a peculiar genius for detail, received ample executive powers. Largely through the exceedingly important services of Gen. William C. Gorgas (q.v.), the questions of sanitation, commissary, housing, and labor were all satisfactorily solved, and a complete social fabric as well as construction organization developed. The Panama Canal came to be known as a model of efficient labor and industrial contentment no less than as a piece of sound engineering. So vigorously was the work prosecuted that its virtual completion was possible in 1914, although the time scheduled had been June 1, 1915. Colonel Goethals received unstinted praise from visiting engineers and from the technical press of the entire civilized world. In 1913 the degree of LL.D. was conferred on him by the University of Pennsylvania, and in the spring of 1914 he was awarded medals by the National Geographic Society, the Civic Forum (New York), and the National Institute of Social Sciences. Late in 1913 and early in 1914 he was in demand for various administrative positions. He declined the police commissionership of New York City, offered him by Mayor Mitchel, and the "city managership" of Dayton, Ohio. On Feb. 3, 1914, he was appointed by President Wilson the first Civil Governor of the Panama Canal Zone. See PANAMA CANAL.

**GOETHE, gē'te, AUGUST VON (1789–1830).** The son of Johann Wolfgang von Goethe (q.v.). He was born at Weimar and occupied the position of chamberlain to the Grand Duke of Saxe-Weimar. He died Oct. 27, 1830, while visiting Rome. By his marriage with the Baroness Ottilie von Pogwisch, a highly accomplished woman, he had three children, of whom WALTHER WOLFGANG (1818–85) was known as a composer of operettas and songs, while his younger brother, WOLFGANG MAXIMILIAN (1820–83), was a jurist and poet. The third, ALMA VON GOETHE (1827–44), died in Vienna. These three grandchildren of the great poet left no offspring.

**GOETHE, JOHANN WOLFGANG VON (1749–1832).** The greatest German writer and one of the greatest of the world, excelling in every literary genre, distinguished in many branches of science and in literary and artistic criticism. He was born in Frankfort-on-the-Main, Aug. 28, 1749. Both his parentage and the place of his birth were significant for his future development. He was among the first of German literary men since the Meistersinger days to spring from a commercial environment and parents closely affiliated with political life in what remained of the old free cities. His father's father was a tailor and innkeeper. His father received a good education, traveled in Italy, attained the distinction of Imperial counselor, and, though never wealthy, was always in easy circumstances. He married (1748) Katherine Elisabeth Textor, and Goethe was the first of their four children, of whom only himself and a sister, Cornelia, survived childhood.

In the pages of Goethe's brilliant autobiographical *Dichtung und Wahrheit* we seldom see his father unbend from his philistine self-

satisfaction. But the mother must have been a very remarkable woman, simple, hearty, joyous, affectionate, not highly educated, but with a faculty of rapid assimilation that made her no unworthy companion or correspondent of persons of deeper culture or higher station. The relation of mother and child was ideal. His childhood and youth owed more to her direct influence than to all else besides. She died in 1808. Her *Letters* are published by the Goethe Society (1894). Consult Heinemann, *Goethes Mutter* (6th ed., Leipzig, 1900).

But Frankfort, too, had a molding influence on him. It was a commercial city, then even more than now one of the great centres of German financial life. Old and new in turn and together left their impress on the brilliant and receptive boy. He was precocious, knew something at eight of Greek, Latin, French, and Italian, had acquired from his mother a knack of story-telling and from a toy puppet show in his nursery a taste for the stage and a stimulus to imagination on which his autobiography lays much stress. He never went regularly to school and as a child showed consciousness of superiority. The French occupation of Frankfort in 1759 served to polish his French and still further to cultivate his interest in the stage. He continued to study books and men at Frankfort till he was 16, and had had one love affair, from which he of course recovered with the facile mobility of youth before he went to Leipzig to study law and be fascinated by his host's daughter, Käthe von Schönkopf.

Leipzig in 1765 was a "little Paris" in its social and literary ideals. Goethe's letters show that he quickly caught a spirit that accorded well with his nature. He studied little, wrote love songs, interested himself critically in art, learned far more about life than about law, and lost his health. By 1768 he had come to look at life on its seamy side, and showed his disillusionment in a drama, *Die Mitschuldigen*, where vice and meanness in manifold variety find it convenient to forgive and forget. This was completed later in Frankfort. Another drama, *Die Laune des Verliebten*, begun in Leipzig, is an embellished version of his relation to Käthe. It was his author's instinct to put into literary form every experience. All his works, he says, are confessions of his life. These two youthful dramatic essays, both in their matter and their form, show Goethe as a realist. He idealized neither the world nor individual characters.

Goethe returned ill to Frankfort in the autumn of 1768. He remained there sick or convalescent till April, 1770, gaining the while from the works of Lessing a sharpened æsthetic sense and a more balanced judgment. Here, too, he began the scientific studies that were later to round out his fame, and from an amiable acquaintance, Fräulein von Klettenberg, the "Beautiful Soul" of his *Wilhelm Meister*, he gained some insight into the phenomena of pietistic religious experience and became interested in alchemy and kindred lore, all of which proved useful for *Faust*.

With health restored Goethe went to Strassburg to continue his legal studies. This city, French in government and institutions, German in people and spirit, was a good place in which to complete a cosmopolitan training. Goethe set himself earnestly to work to pass his preliminary examinations and to learn to dance. He



studied also music, art, anatomy, and chemistry. He had begun to work on his dissertation when, in September (1770) he met Herder (q.v.) and in October made the acquaintance of Friederike Brion (q.v.) the winning daughter of a pastor of Sesenheim. He loved her and let her love him till her visit to Strassburg somewhat dulled the idyllic illusion. He would not, perhaps he felt he ought not, fetter his fortunes and his genius to any yoke. He left Strassburg (August, 1771), carrying with him a sore heart and a sense of wrong to be atoned. Similar situations haunt his literary work of the next years. The Marie of *Gotz*, the Marie of *Clavigo*, the Clärchen of *Egmont*, the Gretchen of *Faust*, spring from this experience, of which he has left a charming and rather objective account in his autobiographic *Dichtung und Wahrheit*. Friederike died unmarried in 1813. They saw each other without strong emotion on either side in 1779.

Meantime Goethe had formed a close intimacy with Herder, who was confined for months to his room through an operation on the eyes. This was hardly less important to Goethe's literary development than the love affair at Sesenheim. They read literary masterpieces and talked of them. Goethe learned through Herder to distrust French classical canons, to appreciate Shakespeare, and to realize that all poetic development must be based on national character if it is to be enduring or beneficent. It was Herder, too, who brought Goethe under the influence of Rousseau, an influence apparent in *Götz*, and especially in *Die Leiden des jungen Werthers*. Herder's influence was inspiring, even when it was merely restraining, for Goethe was already meditating his *Gotz* and even his *Faust*, and both profited by a maturing delay. But Herder finished his work for Goethe at Strassburg. When they met again (1776), Goethe felt he had little to gain, and presently it was he who repaid the old debt.

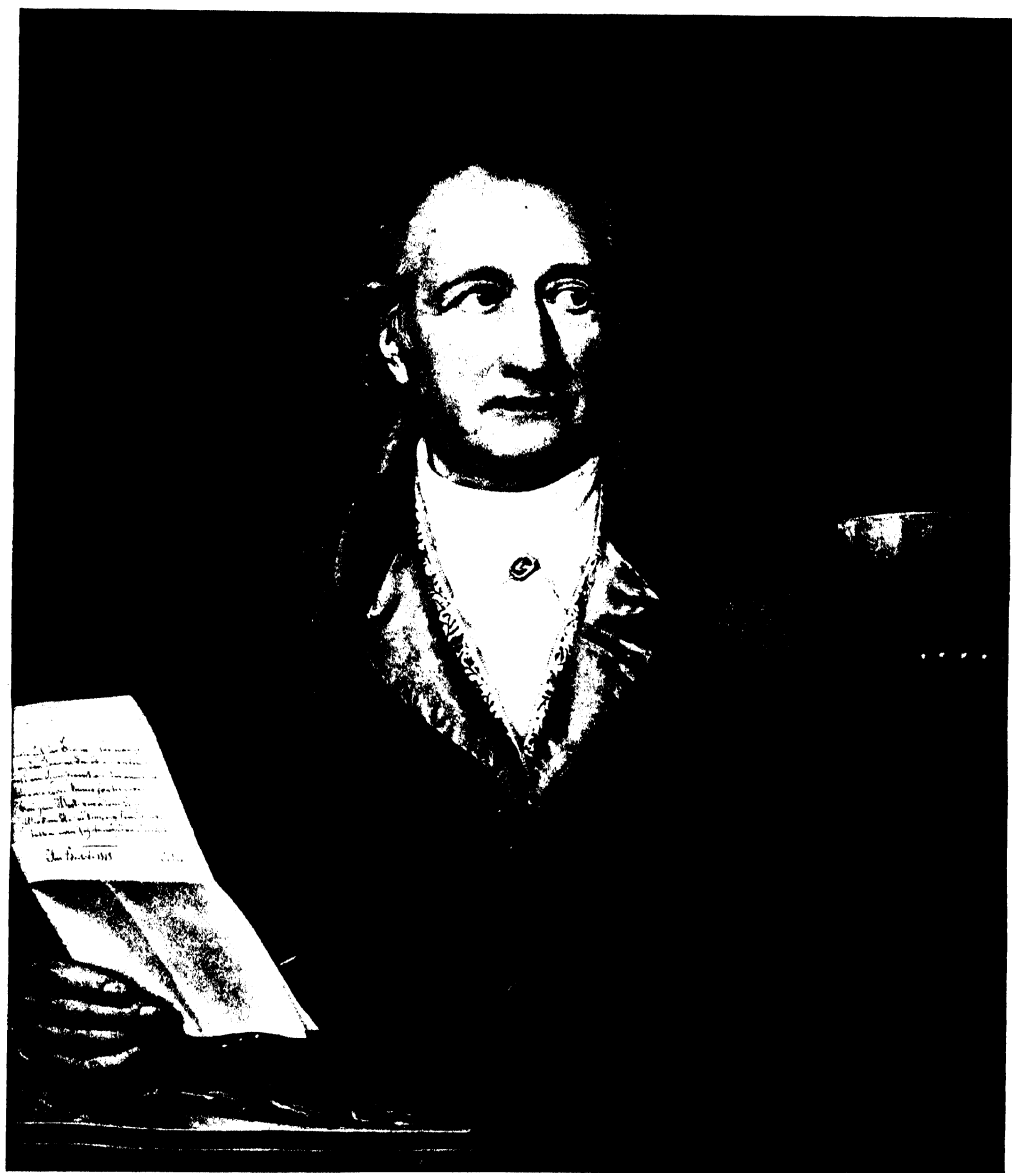
Goethe with his licentiate's degree went back to Frankfurt (1771) and began the nominal practice of law, contributing critical notices to the press and working on *Götz*, which he intended for a more daring proclamation of the newly claimed liberties of the German stage than Lessing, who had won them, would have ventured or approved. It was the trumpet call of the decade of Storm and Stress (q.v.), in which German young blood held high carnival, and in a blind following of Shakespeare naturally showed more of his faults than of his spirit. *Götz* was a dramatic adaptation of the autobiography of a robber knight of the sixteenth century, striking in its local color and naiveté. In his sturdy independence Goethe saw foreshadowed the reassertion of individualism in the eighteenth century, and he made *Götz*, far more than that knight had made himself, typical of the national revolt against the Roman law and church and the centralization of authority. For to Goethe at this time the only progress practicable for Germany lay in the stressing of individuality. But the play as written in 1771 proved too lawless even for his youthful taste. The first sketch was completed in 1771 and remains a curious monument of a period of ferment. It appeared much modified in 1773, struck an answering chord in every heart, and made its as yet unnamed author the literary leader of his time. It gave an immense stimulus to dramatic production, though in cast-

ing all thought of the unities to the winds Lessing thought the "captivating monstrosity" retarded the development of dramatic art. Goethe may have thought so, too; for he subjected it to a radical revision many years later (1804) for the Weimar stage.

This was a period of manifold activity. To it belong some fine songs, among them the *Wanderers Sturmlied*, orations, essays, reviews, and minor work in large quantity, to which he was stimulated by the shrewd and cautious criticism of Merck, an army paymaster at Darmstadt, some of whose traits Goethe used for Mephistopheles. This production was interrupted by a new experience. In 1772 Goethe went to Wetzlar to practice law and fell in love with Charlotte Buff (Lotte), the betrothed of his friend Kestner. From the rather delicate situation thus created Goethe suddenly withdrew (Sept. 11, 1772), and on his way back to Frankfurt managed to find heart for a flirtation with Maximiliane von Laroche, who afterward became the mother of one of his last adorers, Bettina von Arnim-Brentano. Literary expression he gave to his Wetzlar experiences in *Die Leiden des jungen Werthers*, which revealed powers in the German tongue till then unimagined and still unsurpassed. The story, which has been often translated into many languages, is sentimentally morbid and typical of its generation. It was suggested by the suicide of Jerusalem, a student who had formed an attachment for a friend's wife, similar to Goethe's for Lotte. But Goethe, having expressed the mood of his time and age, quickly recovered from it to enter on a period of great creative fecundity, the fruits of which were to appear later in *Faust*, *Prometheus*, *Egmont*, and *Stella*, as well as in many lyrics. Then came his passing betrothal to Lili Schönemann (died 1817), a banker's daughter, the nearest Goethe ever came to a love match. For her he wrote some very beautiful songs, and he cherished her memory till death. But for the time they drew apart (September, 1775), and soon after Goethe was invited by Karl August to be one of his court at Weimar. Meantime Goethe had written *Clavigo* (1774) and many slighter pieces, among them *Götter*, *Helden und Wieland*, and had found in Merck a friend and a caustically discriminating critic, of much value to him in the discipline of genius. His relations to Lili found expression a little later in *Stella* (1776). In May, 1775, he had made a journey to Switzerland with his friends the counts Stolberg, and there became intimate with Lavater, whom he had already met.

The coming of Goethe to Weimar (November, 1775) is a turning point in the literary life of Germany. From 1776 Goethe's influence begins to be paramount wherever German is spoken. Weimar was already beginning to be what it has remained till now, a pleasant residence for the cultured. Goethe made it the Athens of Germany, aided by Karl August and his mother, Amalie, hindered at first by Karl's prim wife, Luise, and by a jealous group of court officials. Goethe was received in Weimar with an effervescence of enthusiastic appreciation. For a time he and his Prince led the court a frolic dance, but presently he settled down to be a prudent and blameless man of affairs and found in this courtly life and the intimate contact with aristocratic society much to widen his mind and give his judgment a balanced calm. For the next 10 years (1776-86) he wrote little save





GOETHE

FROM THE PORTRAIT BY CARL STIELER IN THE NEW PINAKOTHEK AT MUNICH



occasional verses and dramatic trifles, of which the chief is *Die Geschwister*. He began work on *Wilhelm Meister* in 1777. Study of natural science, mineralogy, geology, osteology, intercourse with Herder, Wieland, and others, and his interest in the mines at Ilmenau, claimed his time, and he made a journey to the mining district of the Harz on their account, bringing back impressions that were of use, not only at Ilmenau, but for his *Faust*. He managed the Court Theatre (with some intermissions, till 1817) and the War Department, superintended the roads and bridges, accompanied Karl August on a journey to Switzerland, from which he gathered literary impressions, and above all he maintained a correspondence and intercourse with Charlotte von Stein, a remarkable woman, 33 years old and the mother of seven children, who, in making his life "an enduring resignation," gave his nature more refinement and self-control for the days of his emancipation. For when he had learned from her what she had to teach, he began to chafe both at this relation and at his court life, until in 1786 he asked of Karl August unlimited leave of absence, that he might visit Italy. The literary product of this decade is almost wholly lyric or epigrammatic; but he carried across the Alps the uncompleted *Iphigenie* (which in a prose form had been acted in 1779), *Egmont*, *Tasso*, and *Faust*—works not to be finished in the spirit of their inception.

For the Italian journey marks a most important epoch of Goethe's literary and moral development. All the work that follows is quite different from all that went before. Here Goethe found at last his moral balance. From 1788 till his death he went his way among men with the serenity of perfect self-possession. He went first to Verona, then to Padua and Venice, where he stayed two weeks, and then turned southward to Ferrara and across the Apennines to Florence, where he lingered but three hours, so eager was the impetuous traveler to see Rome (Oct. 29, 1786). Here the poetic stream that had long flowed so scantily was unsealed. By mid-January, 1787, he had turned *Iphigenie* into classic iambs, as a first fruit of the new influences, and was so sure that he was on the right track that he determined to do the same service for *Tasso* on a journey to Naples and Sicily, from which he returned in June.

In Rome he now remained nearly a year, perfecting *Iphigenie*, finishing *Egmont*, working on *Tasso* and *Faust*, and prosecuting zealously artistic and botanical studies. He also lived conubially with a Roman girl, and the connection seems to have revealed to him a joy of life dissociated from the somewhat morbid sentimentality that had characterized his previous relations, especially that with Charlotte von Stein. This new moral attitude is reflected in the *Römische Elegien* (1788), an epithalamium addressed to Christiane Vulpius, a young woman of Weimar, with whom he lived quasi-maritally from 1788 till their marriage in 1806, and afterward till her death (1816), to his own satisfaction, but to the scandal of the ladies of Weimar and the vexation of Bettina von Arnim-Brentano. According to Goethe's correspondence with Christiane, but recently published (*Goethe-Gesellschaft*, Weimar), she was the true and faithful companion of his after life, loving and beloved. His mother treated her from the first as "her daughter," and she earned, after the battle of Jena, the honor of a public recognition

of her place by preserving, at the risk of her life, Goethe's house from French marauders.

Goethe brought to Weimar (June 18, 1788) *Iphigenie* and *Egmont*, with *Tasso* almost in its present form, and an essentially altered conception of *Faust*. *Iphigenie* was planned in 1776 and written in prose in 1779. It was a literary projection of his relation to Charlotte von Stein. Orestes recovers a clear mind in the angelic presence of his sister, as Goethe imagined he would do if Charlotte would "be a sister" to him. Such ethics were unripe and unnatural, and the play lacks action. It was old work made over, and its exquisite versification did not wholly suffice to make it harmonize with his new spirit. There is the same discord of old and new in the prose drama *Egmont*, "the weak, aristocratic twin brother of *Gotz*" (Hermann Grimm). *Tasso* has more unity of conception and execution, though it is deficient in dramatic action, and, indeed, was not put on the stage for 18 years after its publication (1790). It, too, in its pre-Italian prose form (1780-81) reflected Goethe "caught in the snare" of Charlotte von Stein, a situation that in 1786 had ceased to have living interest for him. He concentrated his thought on its form, and made the iambs of *Tasso* so perfect that Schlegel said their very beauty made them unsuited to dramatic dialogue. He also changed the close to conform to his new ethical position.

Goethe's first homogeneous work after his return from Italy was the *Römische Elegien*, in the spirit, he said, of Tibullus, Catullus, and Propertius, the most antique in thought of modern German verse. The frankly naive sensualism that they exhibited, borne out by his conduct, caused Goethe a temporary loss of social popularity in the "imperfectly monogamous" society of Weimar, as well as a breach with Frau von Stein. He had outgrown her and the Weimar circle. Even his literary preëminence seemed to wane. In *Gotz* and *Werther* he had led his countrymen. Now he had passed beyond them in his deepened æsthetic insight. For a time and until rejuvenated by the friendship of Schiller, he gave his time largely to scientific studies, to which he brought not only an original mind, but almost a seer's vision. In 1784 he had discovered the intermaxillary bone by a method that foreshadowed the science of comparative anatomy. In his essay *Die Metamorphose der Pflanzen*, he became, says Esenbeck, "the tender father" of a just-born science; his experiments in optics were ingenious and valuable, though his theory of colors was false, and he was first to perceive the vertebrate character of the human skull. Thus, while his contemporary botanists and anatomists were wandering aimlessly or making dry registration of facts, he gave them ideas whose fruitfulness is not yet exhausted. From these studies Goethe was won back to literature by the friendship of Schiller.

Schiller had been living in or near Weimar since 1787, but a strange irony of destiny kept the poets estranged till 1794, though Schiller was drawing, unperceived, into closer sympathy with Goethe's classic ideals. Meantime Goethe's son August was born (Dec. 25, 1789), the only one of several children to reach maturity. This and the storm clouds of the French Revolution led him to defer a visit to Italy, though in 1790 he went to Venice to meet the Duchess Amalie there, and wrote a group of *Venetianische Epi-*

gramme, that show how his quasi marriage had helped him to a calmer judgment of Italian culture than that of the *Elegies*. Work in lighter vein now attracted him, *Wilhelm Meister* and the Court Theatre (the management of which he undertook in 1791), till in the summer of 1792 he was summoned by Karl August to join him in the invasion of France that was to culminate in the defeat of the Duke of Brunswick at Valmy. Goethe recorded his six weeks' impressions in his *Kampagne in Frankreich* and returned to Weimar to find almost ready for his occupancy a mansion presented to him by the Duke and now, as the home of the Goethe Society and its museum, inseparably connected with his name. The pleasure of this enlarged domesticity is reflected in *Reineke Fuchs*, written in 1793 and published in 1794—the adaptation to social satire of an animal fable that can be traced back to Aesop and to India, though Goethe's immediate model was a German rendering of the mediæval Flemish version of the fable by a certain Willem (about 1250). Out of this comic epic he made, without local or personal illusions, a social and political satire full of ease and vigor, a humorous apotheosis of impudence that has become and is likely to remain one of his most popular poems, though at the time it passed almost unnoticed.

Goethe had met Schiller on several occasions since 1779 and had secured for him a professorship at Jena, though it had seemed to him that the author of *Die Räuber* stood in the way of development of classical taste which, since his return from Italy, Goethe had been desirous to foster. But Schiller was himself developing along these lines, and when they came to understand one another, in 1794, Goethe may well have felt that Schiller, more than any other in Germany, was fitted to appreciate and aid him. He was first to speak of friendship, first to visit his new-found friend. Their intercourse grew constant, especially after Schiller came to Weimar (1799), and was interrupted only by Schiller's death (1805). To Goethe the relation was of stimulating rather than of directing force. He contributed to Schiller's periodical *Die Horen* (1796-97) the *Unterhaltungen deutscher Ausgewanderten* and the *Römische Elegien*, and to the *Musenalmanach* (1796-1800) his share of the *Xenen*—couplets of stinging literary criticism that aroused great excitement and lifelong enmities.

Under this new influence *Wilhelm Meisters Lehrjahre* (1795) was completed—a novel with no definite plot, its purpose being the unfolding of characters drawn from varied social spheres, wonderfully realistic studies involving much ripened worldly wisdom and philosophy. Mignon and Philine are enduring creations, the songs interspersed in the novel are among the most exquisite in any literature, and the analysis of *Hamlet* is a very acute criticism. Some fine ballads and elegies belong to this period also, and it closes with that hymn to the family and masterpiece of classic realism, *Hermann und Dorothea* (1797). Here all is studied from life; there is no idealization, no sentimentality. It was an old story, but instinct with a conservative patriotism in these years of revolution and social upheaval. Other less important works of this period are a realistic drama, *Die natürliche Tochter*, held in higher esteem by more recent critics, and *Achilleis*, an attempt to continue the *Iliad*. Some work was done on *Faust*

also; but sickness and public cares interrupted it, and the first part was not published till it was included in the first edition of Goethe's *Works* (13 vols., 1808).

Meantime Goethe had lost many friends—Gleim, Klopstock, and Herder in 1803, Schiller in 1805, his mother in 1808. In that year Goethe came in frequent contact with Napoleon at Erfurt. It was about this time, too, that Bettina von Arnim-Brentano conceived that violent attachment for him that appears in her *Goethes Briefwechsel mit einem Kinde*, which, however, does not represent an actual correspondence; but Bettina could not endure Christiane, and the acquaintance ceased after 1811. In 1809 Goethe published his second novel, *Die Wahlverwandtschaften*, a story of the conflict of love and conjugal duty, with a tragic close. Though now little read, its influence has been great, for it is the starting point of German psychologic fiction. It has also an autobiographical value. Charlotte is Frau von Stein, and Edward is what Goethe felt he might have become. Ottilie has been thought by some, probably wrongly, to be studied from a young Jena girl, Minna Herzlieb.

From 1811 to 1814 appeared the first three parts of *Dichtung und Wahrheit*, one of the most fascinating autobiographies in any language. It is early memories seen through a long vista of years and under the transforming influence of an artist's eye, beginning with infancy and closing with his coming to Weimar. Meantime the War of Liberation had restored national independence to Germany; but while the fate of his country was changing before his eyes, Goethe was studying the Oriental poets and checking the effect of their exuberance by renewed reading of Homer. It was in these years that he wrote in great part the *West-östlicher Divan* (1819), foreign in externals, mysterious and oracular in parts, but aiming to cultivate international sympathies, social and literary, in years of intense chauvinism. The *Zuleika* poems in the *Divan* have been thought to be addressed in gracefully platonic affection to Marianne Willener, wife of his congenial host on a journey to the Rhine in 1815, but this is very doubtful. He also undertook at this time some antiquarian studies, standing intentionally aloof from the temporal aspirations of the German people that he might labor more effectively for their intellectual uplifting.

The *West-östlicher Divan* is the last work of Goethe's long connubial life. Christiane had died in 1816. He felt the blow severely and said that what remained of life to him was but time granted "that he might mourn her loss." His directorship of the Weimar Theatre he gave up in 1817. But the years that remained to him, "testamentary years," he called them, were to yield much of interest. *Wilhelm Meisters Wanderjahre* may indeed seem dreary reading, though it contains many wise pedagogical observations and some episodes that recall the narrative power of Goethe's prime. To these years, also, we owe the Second Part of *Faust*, the necessary complement of the former, with its teaching that men rise by unselfish altruistic effort. Here, as Scherer noticed, Faust chooses, not wealth, but work, and finds in that choice his salvation. Medately Gretchen brings him to the choice, immediately Helena, the incarnation of Greek ideals, as though to suggest that beauty is positive, creative, revealing the worth

of life, and freeing Faust at last from the Mephistophelean spirit of negation. So the teaching is the same as that of *Wilhelm Meister*. The scholar, as the poet, passes, in Goethe's conception, from a groping, contemplative, searching æsthetic existence under the spur of negative spirits and ideal models, to active, useful labor. Here is to be found Goethe's philosophy of life, which aims to realize the ideal by the idealization of the real, to correlate action with thought. "The rest of my life may be regarded as a free gift," he said as he sealed the manuscript of this Second Part of *Faust*. "It is now really indifferent what I do, or if I do anything at all." It was his philosophic testament to Germany.

It is to this last period, too, that we owe the Conversations (*Gespräche*) with Eckermann, which have preserved to us much keen criticism of men and things, for during these declining years he continued to be in closest touch with the intellectual movement of his own country and of others. Weimar became a goal of pilgrimage to men of many minds and nations. He seemed to Germans the survivor, almost the last, of a heroic age. Some of these visitors give us glimpses of the old man's life, among them Heine, Thackeray, and his old friend Lotte Kestner. After his wife's death he traveled but little, seldom farther than Jena, lingering especially over places associated with his prime, and towards the last working intermittently, as health permitted, on the annals of his Weimar life. In 1828 Karl August died, followed two years later by Goethe's son August, whose widow, Ottilie, cared for her father-in-law to the end. In the same year (1830) Grand Duchess Luise passed away. So Goethe was left, almost the last of his generation. He died in Weimar March 22, 1832, in his chair, so peacefully that men did not know the hour. Eckermann, who saw his body as it was prepared for burial, noted the deep peace and firmness of the features, the magnificence of the limbs, the broad, strong, and arched chest. Nowhere on the body, he says, was there a trace of wasting. "A perfect man lay in great beauty before me." This body lies now, with that of Schiller, in the ducal mausoleum of Weimar in front of the bronze coffins of the two princely patrons of both, Luise and Karl August.

This is the most completely rounded literary life in history—a life of monumental proportion and yet of perfect symmetry, responsive to all intellectual impulses of art, philosophy, and science, open to every light, yet self-poised and self-controlled till its calm seems Olympian. Goethe is at once the representative and the prophet of the modern spirit, reconciling the antinomies of the ideal and the real in the world wisdom of his *Faust*.

The literature that has gathered around Goethe would fill a library—indeed, it does so in the Goethe archives at Weimar, whence issues the great edition of his works, embracing also the *Tagebücher* and *Briefe*, now all but complete. The *Goethe-Jahrbuch* (annual) is devoted entirely to Goethe. An exhaustive bibliography of Goethe literature is to be found in Goedeke, *Grundriss zur Geschichte der deutschen Dichtung*, vol. iv (3d ed., 1910- ). Recent comprehensive editions are those of Heinemann (Leipzig, 1900- ), the *Jubilæums-Ausgabe* (Stuttgart, 1907- ), the *Wilhelm*

*Ernst-Ausgabe* (Leipzig, 1908- ), the *Propylæen-Ausgabe* (Munich, 1909- ), the *Tempel-Klassiker-Ausgabe* (Leipzig, 1909- ), the new *Hempel-Ausgabe* (Berlin, 1910- ). Of the letters there are selections by Von der Hellen (Stuttgart, 1900- ), Stein (Berlin, 1902- ), Richard M. Meyer (Berlin, 1909- ). The correspondence with Schiller is best edited by Graef and Leitzmann (Leipzig, 1912- ), that with Frau von Stein by Fraenkel (Jena, 1908). Von Biedermann has edited Goethe's *Gespräche* (10 vols., 2d ed., Leipzig, 1909- ); Houben has edited his *Gespräche mit Eckermann* (8th ed., Leipzig, 1909).

Of the lives of Goethe, Düntzer's (Leipzig, 1883) is the most complete (also in Eng. trans.). Excellent popular biographies are those by Heinemann (3d ed., 2 vols., Leipzig, 1903); Bielschowsky (25th ed., Munich, 1913; trans. by Cooper, New York, 1905-08); and Witkowsky (2d ed., Leipzig, 1913). Lewes's well-known life is largely superseded by these German works. Another biography in English, by Atkins, appeared in 1904 (London).

Among the later studies of Goethe, omitting all treatises on special works, the most significant are: Weissensfels, *Der junge Goethe* (Tübingen, 1899); Menzel, *Der Frankfurter Goethe* (Frankfurt, 1900); Scherer, *Aufsätze über Goethe* (2d ed., Berlin, 1900); Graefe, *Goethe über seine Dichtungen* (Frankfurt, 1901- ); Bode, *Goethes Ästhetik* (Berlin, 1901); Vogel, *Goethes Selbstzeugnisse über seine Stellung zur Religion* (3d ed., Leipzig, 1903); Hermann Grimm, *Goethe-Vorlesungen* (7th ed., Stuttgart, 1903); Wasielewski, *Goethe und die Descendenzlehre* (Frankfurt, 1903); Richard M. Meyer, *Goethe* (3d ed., Berlin, 1905); Ludwig Geiger, *Goethe und die Seinen* (Leipzig, 1908); Vogel, *Goethes Studenten-Jahre* (3d ed., Leipzig, 1909); Diezmann, *Goethe und die lustige Zeit in Weimar* (4th ed., Weimar, 1909); Bernays, *Der junge Goethe* (new ed., Leipzig, 1909-12); Houston Stewart Chamberlain, *Goethe* (Munich, 1912; in German); Maass, *Goethe und die Antike* (Stuttgart, 1912).

GOETHE, KATHARINA ELISABETH, known as "Frau Rat" and "Frau Aja" (1731-1808). The mother of Johann Wolfgang von Goethe. She was born at Frankfurt on the Main and was a daughter of Johann Wolfgang Textor, a prominent citizen of that city. At the age of 17 she was married to Johann Kaspar Goethe, by whom she had four children. She was a woman of exceptional intellect, marked individuality, and a delightfully joyous cast of mind, as evidenced by her letters, and in the frequent references to her found in the works of her son, upon whose intellectual development she undoubtedly exerted a remarkable influence. She was made the heroine of the work by Bettina von Arnim entitled *Dies Buch gehört dem König* (1843) and is one of the central figures of Gutzkow's famous play, *Der Königsleutnant*. Much of the correspondence of Katharina Elisabeth Goethe has been published in *Goethe's Mother, Correspondence of Catharine Elisabeth Goethe with Goethe* (Leipzig, 1889). Her letters to the Duchess Anna Amalia were published at Weimar in 1885. Consult: Keil, *Frau Rat* (Leipzig, 1871); Erich Schmidt, *Charakteristiken* (Berlin, 1886); Heinemann, *Goethes Mutter* (7th ed., Leipzig, 1904).

GOETHITE, *ge'tit* (named in honor of Goethe). A hydrated iron peroxide that crys-

tallizes in the orthorhombic system, producing slender prisms which pass by gradations into crystalline aggregates and massive forms. The lustre is adamantine and the color yellow red to brown. It occurs with other iron oxides, especially hematite or limonite, in Nassau, Saxony, and elsewhere in Germany; at various localities in England; and in the United States in the Lake Superior region, Missouri, Colorado, California, and elsewhere. Goethite is sometimes found penetrating quartz, like rutile, forming sagenite or "Venus's hair stone," which, when cut, is used for seals and charms in jewelry.

**GOETSCHIUS**, gē'chūs, PERCY (1853- ). A distinguished American musical scholar, writer, and composer, born in Paterson, N. J. A graduate of the Stuttgart Conservatory of Music, he was in 1876 placed in charge of the English classes there and in 1885 was made royal professor. He at the same time contributed to the leading musical journals of Germany. He was called to Syracuse (N. Y.) University in 1890, as professor of harmony, musical history, and advanced pianoforte playing. In 1892-96 he had charge of the composition branch of the New England Conservatory. He was appointed organist of the First Parish Church of Brookline in 1897. In 1905 he became head of the theory department at the Institute of Musical Art in New York. His principal works are: *The Material Used in Musical Composition* (1882); *The Theory and Practice of Tone Relations* (1892); *Models of the Principal Musical Forms* (1895); *Syllabus of Musical History* (1895); *The Homophonic Forms of Musical Composition* (1898); *Exercises in Melody-Writing* (1900); *Applied Counterpoint* (1902); *Lessons in Music-Form* (1904); *Exercises in Elementary Counterpoint* (1900).

**GOETZ**, gēts, (LEOPOLD) KARL (1868- ). A German Old Catholic theologian and historian, born in Karlsruhe and educated at Bonn and Bern. In 1892-1900 he was priest of the Old Catholic Congregation at Passau, for two years was professor in the theological seminary of that denomination at Bonn, and in 1902 became professor in the University of Bonn. His works on Church history, especially as it touched the points in controversy between Rome and the Old Catholics, and on early Russian history, include the following: *Busslehre Cyprians* (1895); *Geschichtliche Stellung und Aufgabe des deutschen Altkatholizismus* (1895-96); *Geschichte der Slavenapostel Konstantinus und Methodius* (1897); *Iazuristen und Jesuiten* (1898); *Leo XIII* (1899); *F. H. Reusch* (1901); *Das Kiever Höhlenkloster als Kulturzentrum der vormongolischen Russlands* (1904); *Kirchenrechtliche und kulturgeschichtliche Denkmäler Altrusslands* (1905); *Staat und Kirche in Altrussland* (1908); and a great work on Russian law, vols. i-iv (1910-13).

**GOETZ**, gēts, THEODOR VON (1826-92). A German battle painter, born in Lieschen, Silesia. He studied at first under the genre painter Hantzsch in Dresden, but turned later to military subjects. He is particularly noteworthy for his faithful representations of the events of the Franco-German War of 1870-71, in which he took part as commander of a battalion of riflemen. His pictures are faithful in detail, but hard in color. The best known include: "Episode in Battle of Sedan" (1875); "Prince George of Saxony in Battle of Saint-Privat" (1876); and "Crown Prince Albert after the

Battle of Beaumont Congratulated by Prince George" (1887, Dresden Gallery).

**GOETZ**, or **GÖTZ**, VON **BERLICHINGEN**, gēts fōn bër'lik-ing'en. See **BERLICHINGEN**.

**GOETZE**, gēt'ze, FREDERICK ARTHUR (1870- ). An American mechanical engineer and educator. He was born in Jersey City, N. J., and was educated at Stevens Preparatory School (1882-85), at Cooper Union, New York (1885-87), and at the Columbia School of Mines (1893-95). From 1895 to 1907 he was assistant superintendent and superintendent of buildings and grounds of Columbia University, where he became dean of the schools of Mines, Engineering, and Chemistry, consulting engineer in 1907, and controller in 1913.

**GÖEZE**, gēt'se, JOHANN AUGUST EPHRAIM (1731-93). A German theologian and naturalist, a brother of Johann Melchior Goeze. He was born at Aschersleben and studied theology at the University of Halle (1747-51). After occupying several pastorates he became deacon of the cathedral at Quedlinburg, where he died. He is best known for his researches in natural history. His microscopical investigations led to the publication of the important work entitled *Versuch einer Naturgeschichte der Insectenwelt* (1782; appendix, 1800). In 1773-74 he prepared about 75 translations of Bonnet's treatises on the natural history of insects.

**GÖEZE**, JOHANN MELCHIOR (1717-86). A German Lutheran clergyman, born at Halberstadt (Province of Saxony, Prussia). Educated at Jena and Halle, he became pastor of the church of the Holy Spirit at Magdeburg in 1750, and in 1755 chief pastor of St. Catharine's Church at Hamburg. From 1760 to 1770 he held the seniority of the Lutheran clergy at Hamburg. He is known chiefly as a tireless controversialist, and in particular for his attacks on Lessing because of the latter's publication, in the "Wolfenbüttel Fragments," of the posthumous *Fragmente eines Ungenannten* (1774, 1777, 1778) of the freethinker Hermann Reimarus. He began the well-known contest in 1777, with an essay in Nos. 55 and 56 of the *Freiwillige Beiträge zu den Hamburgischen Nachrichten*, which he followed by *Etwas Vorläufiges gegen des Herrn Hofrath Lessings mittelbare und unmittelbare feindselige Angriffe* (1778), and *Lessings Schwächen* (1778), all acrid and personal. Lessing made his chief reply in 1778 in *Eine Duplik, Eine Parabel, Axiomata* and *Anti-Goeze*, among both the keenest of his writings and the foremost examples of the literature of the class. The pastor had little of the incisive thought, and yet less of the skillful expression, of his opponent. He was intolerant, even for the time, and a stickler for a narrowly literalistic interpretation of the Scriptures. His polemics against Lessing were edited by E. Schmidt in 1893. Consult his life by Röpe (Hamburg, 1860), and Cropp, "Lessings Streit mit Hauptpastor Goeze," in Heft 155 of the *Deutsche Zeit- und Streit-Fragen* (Berlin, 1881). See **LESSING**.

**GOFF**, JOHN W. (c.1852- ). An American lawyer and judge. He was born at Wexford, Ireland, went to the United States at an early age, and was educated at Cooper Union, New York City. He studied law and in 1870 was admitted to the bar. From 1888 to 1891 he was assistant district attorney of New York City; later he attracted attention as counsel for the

**Law Association** in the investigation and prosecution of election frauds in New York and as counsel for the Lexow Senatorial Committee which investigated police administration in the same city. From 1894 to 1906 he was recorder of the city of New York, and he was elected justice of the Supreme Court of New York, first district, for the term of 1907 to 1920. In 1912 he presided over two of the most famous criminal trials ever held in New York—the first trial of Charles Becker, former police lieutenant, who was convicted of instigating the murder of the gambler Herman Rosenthal, and the trial of the four gunmen convicted of the actual shooting.

**GOFF, NATHAN** (1843– ). An American legislator, born at Clarksburg, W. Va. He was educated at Georgetown College and at the University of the City of New York, and from 1861 to 1865 served in the Union army, rising from the rank of lieutenant to major. Admitted to the bar in 1866, he then was (Republican) member of the West Virginia House of Representatives in 1867, United States district attorney in 1868–81, Secretary of the Navy under President Hayes in 1881, again United States district attorney in 1881–82, and member of Congress (1883–89). In 1888 his election as Governor of West Virginia was successfully contested by his Democratic opponent. He served as United States circuit judge from 1892 to 1911 and as judge of the United States Circuit Court of Appeals in 1912–13, and was elected United States Senator for the term of 1913–19.

**GOFFE, göf, WILLIAM** (?-c.1680). An English regicide, born in Sussex, where his father was the rector of a church at Stammer. Apprenticed to a salter in London, he embraced the cause of the Parliament against Charles I and in 1645 was commissioned a captain in the New Model army, in which by his zeal and bravery he won rapid promotion. He was one of the judges at the trial of Charles I and signed the death warrant. He commanded Cromwell's old regiment at the battle of Dunbar and distinguished himself at Worcester. He was elected to Parliament in 1654 and was promoted major general in 1655, with command in Sussex, Berkshire, and Hampshire. In 1656 he supported the proposition to offer the crown to Cromwell, by whom he was appointed a member of the newly constituted House of Lords. At the Restoration he was excepted from the Act of Indemnity and escaped with his father-in-law, General Whalley, to America, settling first at Cambridge, and thence removing to New Haven in 1661 to escape arrest. He remained in hiding in and about New Haven and Guilford until 1664, when he fled for safer refuge to the house of the Rev. John Russel in Hadley, Mass. There is a tradition that he appeared on the occasion of an Indian attack upon Hadley on Sept. 1, 1675, rallied the frightened townsmen, and drove off the raiders. But there is no other record of even an attack on the town at that time. However, the incident has been used by Scott in his *Peveril of the Peak* and by Cooper in his *Wept of Wish-ton-Wish, or The Borderers* and forms the subject of "The Gray Champion" in Hawthorne's *Twice-Told Tales*. There is an affidavit alleging that Goffe was in Hartford in 1680, but there is no other trace of him subsequent to 1679. Consult Stiles, *History of Three of the Judges of King Charles I* Vol. X.—7

(Hartford, 1794), and a close study by Sheldon in the introduction to the new edition of Judd's *History of Hadley* (Springfield, 1905).

**GOFFSTOWN.** A town in Hillsborough Co., N. H., 8 miles northwest of Manchester, on the Boston and Maine Railroad, and on the Piscataquog River (Map: New Hampshire, G 7). It contains the St. Anselms College and a public library. Goffstown is a summer resort and has manufactories of sashes and blinds. The town was first settled in 1748 and incorporated in 1761. Pop., 1900, 2528; 1910, 2579.

**GOG AND MA'GOG.** In Ezek. xxxviii. 1–xxxix. 20, an oracle is directed against Gog, Prince of Rosh, Meshech, and Tubal, announcing that he will be led to invade Palestine, accompanied by Paras, Cush, Put, Gomer, Togarmah, and people from "the sides of the north," only to meet with a crushing defeat on the mountains of Israel and to be buried with all his host in "the Valley of the Travelers to the Sea." "To the land of Magog" has the appearance of being an interpolation in xxxviii. 2, and the Greek translator seems to have read "Gog" and not "Magog" in xxxix. 6; the glossator evidently regarded Magog as a term covering the realm over which Gog ruled. Gog also occurs in the Greek version of Num. xxiv. 7 and Amos vii. 1; but the original reading in the first passage is doubtful, and the second is probably a late interpolation. Magog appears as one of the sons of Japhet in Gen. x. 2. As all the other sons represent well-known peoples—the Cimmerians, Medes, Greeks, Moschi, Tibarenes, and Tyrrhenians—Magog, no doubt, also stands for a definite people. If the name has been correctly transmitted, it may yet come to light in ancient inscriptions. It may be an expansion of Gog, which occurs in the form of Ga-ga in a letter of Amenhotep III (1411–1375 B.C.) to Kadashmanharbe (*Amarna Tablets*, i, 38) as the name of a people, and seems to have survived to the time of Strabo in Gogarene, north of Sacasene, near the Cyrus River (xi, 14). Josephus (*Ant.*, i, 123) and Jerome (*Com. in Ezech.*) understood Magog as referring to the Scythians. In Gen. x. 3 Ashkenaz (Ass. Ashkuzā), son of Gomer (q.v.), appears to represent the Scythians. But just as the terms "Scythian" and "Sakae" were used by Greeks and Persians of many ethnic elements, so Gog, or Magog, may have come to include in later times both the Scythians proper and many other nations, like the Sarmatians, the Roxalani, the Bastarnians, and the Massagetae.

Some modern interpreters, among them Wellhausen and Smend, regard Gog as a fictitious personage representing the reflection of the Scythian invasion in 625 B.C. expected by Ezekiel to recur again. Others, like Bousset and Gressmann, who regard the two chapters as later than Ezekiel's time, consider Gog as a mythical figure and look to Babylonian lore for an elucidation of the oracle. Others have felt that a distinct historic personage is in the author's mind. Grotius was led by a suggestion already thrown out by Polychronius, the brother of Theodore of Mopsuestia, to the idea that Ezekiel used the name of the Lydian King Gyges in prophesying the career of Antiochus III. Seignette thought of Antiochus IV Epiphanes. Winckler assumed that the writer was a contemporary of Alexander the Great and referred to his invasion of Syria. But neither Antiochus III nor Antiochus IV nor Alexander could well be designated as "prince of Rosh, Meshech, and

Tubal." Schmidt suggested that "prince of Meshech and Tubal" would be a most appropriate title of Mithridates VI of Pontus, a native and ruler of the territory associated with these names. If "Rosh" is the name of a people and refers to the Roxalani, the Ros of Georgius, Simon Logotheta, Zonaras, and Tzetzes (Gesenius, *Thesaurus*, s. v.), the appropriateness, after the victory over this people by Mithridates, is even more striking. Among his forces were Persian auxiliaries, Egyptian ships, Cappadocian troops, Armenian contingents, and Scythian, Sarmatian, and Bastarnian soldiers. His terrible massacre of 80,000 Italians in Asia Minor, and his robbery of 800 talents from the Jews on Cos, then in league with Rome, would naturally have aroused hatred and excited the fear that he would invade Syria, as his ally Tigranes afterward did, and also the hope that he would be defeated on the old battlefields in the valley of Esdraelon, and that the ruler of Scythia would be buried in the city of Scythopolis (Beth Shean). If this identification is correct, the name "Gog" would be natural, and the position of the oracle in the Book of Ezekiel would be due to a reader or copyist familiar with his style. In Rev. xx. 8 Gog and Magog are nations gathered from the four corners of the earth by Satan to the last war after the millennium. It was probably through Christians that Mohammed became familiar with them. He alludes to Yagug and Magug as nations against whom Dhu'l Karnain (Alexander) built a marvelous wall (Koran, xviii, 93-97), and also as peoples that were to appear in the distant future (ib., xxi, 95 f.). A poem by a Christian of Edessa published by Knös (*Chrestomathia Syriaca*, Göttingen, 1807) also refers to Alexander and the wall of brass. Rumors of the Chinese Wall, built by Shi Hwang Ti, are probably at the basis of the legend. Mohammed's references to the wall naturally awakened curiosity; and al Wathik is said to have sent an expedition from Samarra in 842 A.D. to seek for it, which reported to have found it 27 days' journeys beyond Derbent on the Caspian Sea. They could not have reached the Chinese Wall in that time; and if they had, they would have known that it was not of brass. Arabic geographers relate that Yagug and Magug are of small stature and live chiefly on fish. The description applies well to the Massagetae, a Scythian people in the wider sense of the term, whose name seems to mean "fish eaters." In Arabic as well as later Hebrew eschatology Gog and Magog are to come to the last war across Lake Tiberias to the plain of Esdraelon. Consult: the commentaries on Ezekiel by Jerome, Polychronius, in Migne, *Patrologia Graeca*, Grotius, vol. clxii (Paris, 1854-66), Rosenmüller, Hitzig, Smend, Knabenbauer, Bertholet, Krätzschmar, Skinner, Toy, Lofthouse; also Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914); Seinecke, *Geschichte des Volkes Israel*, vol. ii (Göttingen, 1884); Winckler, *Altorientalische Forschungen*, vol. ii (Leipzig, 1898); Schmidt, art. "Scythians," *Encyclopædia Biblica* (New York, 1903); Bousset, *Die Religion des Judentums* (Berlin, 1903); Gressmann, *Der Ursprung der israelitisch-jüdischen Eschatologie* (Göttingen, 1905); Weber, *Jüdische Theologie* (Leipzig, 1897); Herrmann, *Ezechielstudien* (Leipzig, 1908); Herbelot, *Bibliothèque Orientale*, art. "Iagiouge et Magiouge" (2d ed., Paris, 1783); Michaelis, *Supplementa* (Göttingen,

1784-92); Gesenius, *Thesaurus* (Leipzig, 1835-53, "Rosh" by Roediger); Montgomery, "Gog and Magog," *The Jewish Encyclopedia*, vol. vi (New York, 1904).

Gog and Magog are names popularly given to the two wooden statues of giants preserved in the Guildhall at London. According to the story, the living prototypes of the two figures were the survivors of a race of giants found in Britain by Brute, son of Antenor of Troy, and by him subdued. They were brought prisoners to London, where they were chained to the gates of a palace on the site of the Guildhall and kept as porters. When they died, their effigies were set up in their place. This is Caxton's account; but there is another, which represents one of the giants as Gogmagog and the other as a British giant who killed him, named Corineus. The two giants have been the pride of London from time immemorial. On London Bridge they welcomed Henry V in 1415; in 1558 they stood by Temple Bar when Elizabeth passed through the city gate. The old giants were burned in the great fire, and the new ones were constructed in 1708. They are 14 feet high and occupy suitable pedestals in the Guildhall. The ancient effigies, which were made of wickerwork and pasteboard, were carried through the streets in the Lord Mayor's shows, and copies of the present giants were in the show of 1837.

**GOGARI.** See GOGRA.

**GOGGERLY**, gō'jër-lī, DANIEL JOHN (1792-1862). An English missionary and scholar, the founder of Pali scholarship. Born in London, of German descent, he left England in 1818 to take charge of the Wesleyan Methodist printing office in Colombo, entered the ministry in 1822, and labored as a Methodist missionary in Ceylon. He developed remarkable linguistic talent, could preach in Singhalese and Indo-Portuguese, and was the first European to master the ancient sacred Buddhist language of Pali, the native language of Magadha, the country of the Buddha. He not only compiled a *Dictionary* of 15,000 words, but had the Buddhist priests write out the whole of their Pali books with their authorized glossaries or comments, a collection he bequeathed to the mission. In 1838 he became superintendent of the mission. He translated the *Jātaka-pāṭa* (the Book of 550 births of Buddha), and by his translations and discussions was the first to introduce to European scholars a scientific knowledge of the Pali in original Buddhism. He also published in 1862 the first able defense of Christianity in Singhalese, a book which led by reaction to the awakening of the Buddhist consciousness in Ceylon. He died at Colpetty, Ceylon.

**GOG'GLE-EYE'** (so called from its protruding eyes). The rock bass (*Ambloplites rupestris*), locally so called. See ROCK BASS; WARMOUTH.

**GOG'GLE-NOSE'** (so called from the round, black spots on its nose, which resemble goggles). A local name among American gunners for the surf scoter (duck). See SCOTER.

**GOGH**, gōg, VINCENT VAN (1853-90). A Dutch figure, still-life, and landscape painter, one of the leaders of post-Impressionism (q.v.). He was born at Groot-Zundert, a village of North Brabant (Holland), the son of a Protestant clergyman. Destined for an art dealer, he was until his twenty-third year in the employ of the firm of Goupil and Company, at The Hague, London, and Paris. He was a school-



master in England, studied theology in Amsterdam, and then became an evangelist among the gold miners of Belgium. Although he had always designed and modeled, he did not begin the study of painting until 1882, at The Hague. In 1884 he studied a short time at the Academy in Antwerp, whence he removed to Paris, joining his younger brother, Theodore, an art dealer of Modernist predilections, who brought him in touch with the Impressionists. He afterward removed to southern France, painting at Arles and Saint-Remy. At this time he was much in the company of Gauguin (q.v.), who greatly influenced his work. Always in delicate health, he spent his last days in a hospital for nervous diseases at Auvers-sur-Oise, and there he committed suicide.

His work naturally falls into two periods, separated by the year 1885—a Dutch period of preparation and the French period of his mature art. His earliest works were powerful peasant pictures, such as "Winter" and "The Shepherds" (both in the Peletier collection, Utrecht) and the remarkable "Potato Eaters." His landscapes of the country about Arles and elsewhere in southern France are characterized by broad surfaces of color, skillful treatment of light, and linear rhythm. A fine "Autumn Landscape" is in the Museum of Meudon. He also painted characteristic figure pieces, such as several peasant women of Arles, Dr. Gachet, and his own portrait in several versions, and the powerful and gloomy "Prison Court." He was, above all, a colorist, who worked in broad surfaces of pure color rather than in values. His letters to his brother Theodore, who supported him throughout his artistic career and died of grief as a result of his death, and to his friend Emil Bernard, were published by the latter in 1911. They contain strikingly original views on art, expressed with force and lucidity. An English version of his letters was published under the title *Letters of a Post-Impressionist* (Boston, 1913). Consult the monographs by Meyer-Graefe (Munich, 1910) and Bremer (Amsterdam, 1911).

**GOGOL**, gŏ'gŏl, NIKOLAI VASILIEVITCH (1809–52). One of the greatest of Russian writers, born in the Province of Poltava (Little Russia), of a family of Cossack origin. On graduating at the Nyzhni Lyceum he went to St. Petersburg (1828) and was a clerk in the Department of Appanages in 1830–32. During these years he published a series of sketches, *Evenings at a Farmhouse near Dikanka*. In these he exploited his personal knowledge and his grandfather's stories of Cossack everyday life. These sketches attracted immediate attention and introduced their author into the select circle of Pushkin and Zhukovsky (qq.v.), who obtained for Gogol an instructorship in literature and in 1834 an adjunct professorship in history. This latter position he soon resigned for purely literary work. During 1832–34 appeared a second series of Ukrainian sketches, *Mirgorod* (collected in 1835), containing among others, *Taras Bulba*, *Old World Proprietors*, and *How the Two Ivans Quarreled*. *Taras Bulba*, rewritten and enlarged in 1842, is a glowing picture of the Cossack struggles with the Catholic Poles and Mohammedan Tatars in the sixteenth century. It is an epic in poetic prose and the best historical novel of the time. The two other sketches are minute studies of the picturesque life of Little Russian (Ukrainian) villages.

After these inimitable bits of realism Gogol wrote two series of sketches in a more romantic vein—*Arabesques* (1834) and *Tales* (1836), dealing with Great Russian life, chiefly of St. Petersburg. In 1836 appeared the comedy *Revizor* (Inspector General), which held up to ridicule the ignorance, corruption, trickery, and arbitrariness of provincial officialdom. A distressed cry of treason went up from all who were supported by state money, and but for the will of Nicholas I, who heartily enjoyed the bold comedy, it would have been immediately withdrawn from the stage. The intense mortification at the general protest his play aroused undermined Gogol's constitution, and for 12 years thereafter he lived mostly abroad, searching in vain for health. In 1842 he published the first volume of *Dead Souls*, describing the adventures of one Chichikov, who travels all over Russia in pursuance of a scheme to become an estate holder by purchasing the dead serfs (souls of the dead), who are officially counted as living until the next census is taken. This almost plotless novel presents types of all walks of Russian life, drawn with all of Gogol's former art and with a mastery still more marked. The second volume was almost ready in 1845; but the author, in a fit of hypochondria, of which he had become a victim and which made him a religious mystic and champion of autocracy, consigned the precious manuscript to the flames. A rough draft and detached scraps of it found after his death were pieced together and published by his friends. It clearly reflects his dwindling intellectual powers; the personages are mostly figures of the "respectable" type, drawn not from actual life, but simply as a foil to the characters in the first volume. The *Excerpts from the Correspondence with my Friends* (1847) presented the painful spectacle of recantation and negation of his artistic work, in a manner anticipating Tolstoy's similar utterances. Gogol died in Russia, after a pilgrimage to Jerusalem in 1848. He is generally considered the founder of the Natural school, and the father of realism and the modern period of Russian literature. The latest complete edition of his works in Russian is that of Rykov (Moscow and St. Petersburg, 1911), containing a good biographical sketch by Dmitry Merezhkovsky. Almost all his works are available in both French and German. The English translations are: Hapgood, *St. John's Eve and Other Stories*; *Taras-Bulba*; *Tchitchikoff's Journeys, or Dead Souls* (New York, 1886); Mandell, *The Revizor* (New Haven, 1910).

**GOG'RA**, or **GOG'ARI**. One of the largest affluents of the Ganges (q.v.), British India, joining that river from the left near Dinapur after a generally southeast course of 600 miles. It rises in lat. 30° 28' N. and long. 58° 40' E., on the southern declivity of a Himalayan range near the border line of Nepal and Tibet. After receiving many tributaries on both sides, it enters the great plain of Hindustan, 148 miles from its source, and 70 miles lower down becomes navigable for craft of considerable burden. Farther down it is navigable for boats of all sizes at all seasons and is one of the most important waterways of India. The principal affluents are the Sarju (a name sometimes applied to reaches of the Gogra) and the Rapti.

**GOHIER**, gŏ'yŏ', LOUIS JERÔME (1746–1830). A French politician, born at Semblançay (Indre-et-Loire). A distinguished advocate, he was

deputy from Ille-et-Vilaine to the Legislative Assembly of 1791, where he strongly opposed the civil constitution for the clergy. The following year he became Secretary of the Department of Justice and then Minister of Justice (1793), succeeding Garat. He was president of the criminal court, judge of the Court of Cassation, and last President of the Directory (1799). He refused to participate in Napoleon's coup d'état. In 1802 Napoleon made him Consul General to Holland and wished to send him in the same capacity to the United States (1810), when Gohier retired from public life. His *Mémoires* were published in 1824.

**GOIL**, goil, Loch. A small sea loch in Argyllshire, Scotland, a branch of Loch Long, 6 miles in length and less than 1 mile in breadth. Its shores are very steep, wild, and rugged, but diversified by extensive woods of hazel. Lochgoilhead is a favorite summer watering place.

**GO'ING**, CHARLES BUXTON (1863- ). An American engineer, author, and editor, born at Westchester, N. Y. Graduating from Columbia College School of Mines in 1882, he at once took up, in the Middle West, active work in industrial chemistry and corporation management. He joined the staff of the *Engineering Magazine* in 1896, becoming managing editor in 1898 and editor in 1912. In this connection he did much to discern, define, and establish the now fully recognized profession of "industrial engineering." He became special lecturer on this subject at Columbia, Harvard, New York University, and the University of Chicago, and much of the best literature on this subject appeared under his editorial encouragement. He received the degree of M.Sc. (hon.) from Columbia in 1910. His writings include *Methods of the Santa Fé* (1909) and *Principles of Industrial Engineering* (1911), and, in lighter vein, *Summer-Fallow* (1892) and *Star-Glow and Song* (1909); also, in collaboration with Marie Overton Corbin (later Mrs. Goings), *Urchins of the Sea* (1900) and *Urchins at the Pole* (1901). He was a contributor to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

**GOITO**, gò'a-tò. A town in the Province of Mantua, Italy, on the right bank of the Mincio, 11 miles northwest of the city of Mantua (Map: Italy, C 2). Its vicinity to Mantua has made it the scene of numerous battles, notably that between the Piedmontese and the Austrians in April and May, 1848, when the former were victorious. Pop. (commune), 1901, 5694; 1911, 6702.

**GOITRE** (Fr., from Lat. *gutter*, throat). An enlargement of the thyroid gland (q.v.) occupying the front of the neck, and sometimes of such a size as to project downward over the breast and even admit of being thrown over the shoulder. Goitre is, for the most part, an endemic or local disease, being found in the mountainous regions of the Alps, Andes, and Himalayas, in the Pennine Range, and in Derbyshire, England (whence Derbyshire neck), in the Rhone valley, in the Indian Punjab, and in north Italy, especially, it is said, where lime prevails largely as a geological formation. The connection of goitre with drinking water is a very ancient belief. Goitre wells are mentioned by Pliny and Vitruvius. Mungo Park is said to have found evidence of the belief in Africa, and Gage discovered a similar one in the West Indies in the seventeenth century. Men subject to military service drink the water of goitre wells in order to acquire the disease and thus

escape conscription. On the other hand, families living in goitre districts have been known to escape the malady by drinking only rain water or wine. Again it has been noted that goitre streams or wells may change their character. Sometimes a well may acquire goitre-producing qualities. Some rivers produce goitre only at particular points in their course. In certain goitre districts in Italy and Switzerland the disease has been controlled by the introduction of water from a goitre-free region. Women are oftener affected with goitre than men. An explanation offered for this fact is to the effect that they drink more water than men. Répin, in 1908, found a high degree of radioactivity, due to radiothorium, in the waters of the Swiss Alps. Goitre is met with endemically to a slight extent in various parts of Scotland, but on a very small scale indeed as compared with Switzerland, in which it is a very important deformity, especially when connected with cretinism (q.v.). Sporadic goitre may occur in any country. The pathological changes which underlie the enlargement of the thyroid in goitre are not always the same in all cases. The enlargement of the gland may be due to a general hypertrophy of all the tissues, *simple goitre*; or depend on an overgrowth of the fibrous elements alone, *fibrous goitre*; or one or several of the normal alveolar spaces may become dilated, constituting *cystic goitre*; in other cases there is little new gland formation, the increase in size being due to dilatation of the blood vessels, which causes an expansile pulsation in the mass, *pulsating goitre*; later on, the gland may become indurated from the deposition of lime salts, forming the variety known as *calcified goitre*. The thyroid gland often becomes temporarily enlarged in women during the menstrual period or at puberty. In the form of goitre known as exophthalmic goitre (see BASEDOW'S DISEASE), which is marked by protrusion of the eyes (*exophthalmos*) and functional disturbance of the heart action, there is increase in the size of the thyroid, which is in most cases a condition of active glandular proliferation. From the symptoms of this disease taken in connection with the known effect of thyroid extract upon the system, there is little doubt that the change in the gland is the pathological basis of the disease. The treatment of goitre, not of the exophthalmic variety, consists in the administration of very minute doses of iodine for a long time internally, locally by inunction, or locally by cataphoresis. The X-ray alleviates or cures in a large percentage of cases. (See ELECTRICITY, MEDICAL USES OF.) In a few rare cases the administration of thyroid gland has cured. In others the administration of thymus gland has cured. In India, especially, applications of the biniodide of mercury to the tumor, followed by exposure to the sunlight, has proven a successful method of treatment. Consult article on "Goitre" by Dock, in Qsler's *Modern Medicine* (2d ed., Philadelphia, 1914), and McCarrison, *Etiology of Endemic Goitre* (London, 1913).

**GOKHALE**, gò'kāl-a', GOPAL KRISHNA (1866-1915). An East Indian educator and political leader. He was born in Bombay and, after receiving an excellent education in native and English colleges, became a professor in Ferguson College, Poona. There he remained for 20 years, during which he devoted himself to promoting education among his Mahratta fellow

countrymen. He became actively identified with the National Indian Congress movement, and by his moderation and enlightened views came to be accepted as a safe leader of the Indian Progressives. In 1905 he was elected President of the Indian Congress. He gave evidence before the Indian Expenditure Commission in London. In 1905 he founded the Servants of India Society and in 1912 was appointed a member of the Royal Commission on Public Services in India. He was elected a fellow of Bombay University. As a writer and speaker also, he became well known.

**GÖKINGK**, gē'kīnk, LEOPOLD FRIEDRICH GÜNTHER VON. See GÖCKINGK.

**GOKTCHA**, gōk'chū, or **SEVANGA** (syē-vān'gā) **LAKE**. A lake in the Transcaucasian Government of Erivan, situated at an altitude of about 6300 feet and surrounded by high barren mountains of volcanic origin (Map: Russia, G G). It is about 45 miles long, 23 miles wide, 67 fathoms deep, and has an estimated area of 540 square miles. It receives a large number of mountain streams. The outlet is through the Sanga, a tributary of the Aras. In the northwestern part of the lake is the lava-formed island of Sevang, with an old Armenian monastery.

**GOLAW**, gō'lāv, SALOMON VON. The pseudonym of the German epigrammatist Friedrich Logau (q.v.).

**GOLCON'DA**. A ruined city and fortress in the Nizam's dominions, India, 5 miles west-northwest of the capital, Hyderabad, in lat. 17° 22' N. and in long. 78° 25' E. The ruins of the ancient city, once the metropolis of the Kingdom of Golconda, the solid mausolea of its former sovereigns, which form a vast group at a distance of 600 yards from and overlooking the fortress, and the fortress itself, are all of great archaeological importance and interest. The fort is now used as a state prison and as the Nizam's treasury. Golconda is proverbially famous for its diamonds, which, however, were merely cut and polished here, being generally found at Purtil, near the southern frontier of the Nizam's dominions.

**GOLD** (AS., OHG. *gold*, Ger. *Gold*, Goth. *gulþ*; connected with AS. *geolū*, Eng. *yellow*, Lat. *helvus*, grayish yellow, Gk. *χλωρός*, *chlōros*, yellowish green, Skt. *hari*, yellow). A metallic chemical element, probably the first metal known to man. The alchemists regarded gold as the most perfect metal, compared it to the sun, and designated it by the same symbol by which they represented that orb; their efforts were constantly directed towards the transmutation of baser metals into pure gold. Gold is widely distributed in nature and is frequently found native, though usually alloyed with silver and containing small quantities of copper or iron; it is also associated with palladium, rhodium, and bismuth. It is sometimes found crystallized, usually as octahedra or tetrahedra, but more commonly in thin laminae or grains in sand or gravel. Its presence in this condition is believed to have been caused by the disintegration of gold-bearing rocks, and it is readily collected from such alluvial sources by washing the auriferous soil. The purest specimens of native gold have yielded from 99.7 to 99.8 per cent of the pure metal, the average California gold containing .88 per cent, while Australian gold sometimes runs as high as 96 per cent pure

metal. Gold also occurs in combination with mercury as electrum, with silver and tellurium as sylvanite, and with tellurium and lead as nagyagite. It is further found in various sulphides, as those of copper, lead, iron, and zinc: also in other ores, and in very small quantities in sea water.

Gold (symbol. Au; atomic weight, 197.2) is of a bright yellow color when pure and has a high metallic lustre. It is the most malleable of all metals and has been hammered into a leaf 0.00009 millimeter in thickness. In this condition it appears green by transmitted light. Gold is very ductile and can be drawn into wire so fine that 166 meters weigh but a single gram. Its specific gravity is 19.31, and it melts at about 1075° C. It is a good conductor of both heat and electricity. Whatever the temperature, neither water nor oxygen is capable of attacking it: and it is not affected by fusion with potassium chlorate. It yields, however, to alkalies and nitrates and especially to sodium or potassium cyanide. It is not dissolved by any single acid, except selenic, but readily passes into solution when treated with aqua regia (a mixture of nitric and hydrochloric acids) or with other acid liquids in which chlorine or bromine is evolved. Pure gold, being too soft for all ordinary purposes, is generally alloyed with other metals. With copper it yields a reddish alloy, which is quite hard; the standard metal used for coinage is made up of 900 parts of gold and 100 of copper. With silver it yields so-called "white alloys," which are used for jewelry. It amalgamates readily with mercury, forming a white amalgam of a pasty consistency. The most extensive uses of gold are for coinage, jewelry, gilding purposes, electroplating, and in dentistry.

**Compounds**. With oxygen gold forms a monoxide, or *aurous oxide*, and a trioxide, or *auric oxide*. The former is obtained by decomposing aurous chloride with cold dilute potassium hydroxide; the latter by heating a solution of gold trichloride with an excess of magnesia and well washing the precipitate with nitric acid. Auric oxide, which is the more common of the two, combines with bases, forming salts called *aurates*. Perhaps the most important of the compounds of gold with acids is auric chloride, which is readily obtained by dissolving metallic gold in aqua regia and evaporating the solution to crystallization. The resulting orange-red crystals may be further purified by recrystallization. It is a very deliquescent salt and is chiefly employed for toning silver prints in photography.

**Fulminating Gold**, which was originally described in a work published under the name of Basil Valentine, is a green or brown powder that readily explodes when dry; it may be obtained by the action of ammonia on gold hydroxide, or by precipitating gold chloride with ammonia or its carbonate.

**Gold Purple**, or **Purple of Cassius**, which was originally prepared by Andreas Cassius, and described in 1685, is a flocculent purple precipitate obtained by treating a solution of stannous and stannic chlorides with gold chloride. The resulting product is believed to be a mixture of tin oxide and finely divided gold. The color of ruby glass is due to small proportions of this pigment.

**Mosaic Gold** is a fine flaky yellow variety of tin bisulphide; it is prepared by heating a mix-

ture of seven parts of sulphur, six parts of ammonium chloride, and 18 parts of a powdered amalgam consisting of two parts of tin to one of mercury. When the odor of hydrogen sulphide is no longer perceptible, the heat is raised to low redness, and the mercurous chloride, ammonium chloride, and mercuric sulphide are volatilized. The mosaic gold thus obtained is used as an imitation bronze in the arts.

**Production of Gold.** The supply of gold in ancient times was derived mostly from surface deposits of sands and gravels which yielded their values by simple processes of washing. Gold was thus mined at a very early period in India, Central Asia, the southern Urals, and in the region bordering the eastern Mediterranean. With the progress in metallurgical knowledge attention was directed to the exploitation of auriferous veins, a branch of the industry which seems to have attained to some importance before the opening of the Christian era. Ancient workings of this character, ascribed to the Egyptians, have been found in the mountains of Nubia; and Dr. Karl Peters has described extensive mines in the interior of South Africa, not far from the gold fields of Rhodesia—a locality believed by Dr. Peters to be the Ophir of the Israelites. The Romans operated mines in Hungary, Spain, and Great Britain at various periods. During the Middle Ages the mining industry seems to have made little progress. It is estimated that the total stock of gold in Europe when America was discovered did not exceed \$225,000,000.

The first gold mined in the United States came from the Appalachians. As civilization advanced west the production increased. With the discovery of new districts, such as California, South Africa, Australia, and Alaska, the increase in production was very marked. With improvements in the metallurgical extraction, low-grade deposits have become workable which only a few years ago were considered of no value; this has resulted in a gradual increase, not so marked as the discovery of new districts.

WORLD'S PRODUCTION 1493-1912 \*

PERIOD	Years	Annual average production
1493 to 1600	107	\$4,687,000
1601 " 1700	100	6,064,000
1701 " 1800	100	12,628,000
1801 " 1850	50	15,750,000
1851 " 1875	25	126,960,000
1876 " 1880	5	114,586,000
1881 " 1885	5	99,116,000
1886 " 1890	5	112,895,000
1891 " 1895	5	162,947,000
1896 " 1900	5	257,301,000
1901 " 1905	5	328,619,000
1906 " 1910	5	433,453,000
1911	1	461,542,000
1912	1	466,136,000
1913 †	2	455,534,000

\* Annual Report, 1912, Director of the Mint.

† Estimate by Director of Mint.

The accompanying statistics of world production were compiled by the late Adolf Soetbeer and by the United States Mint from the most authoritative sources. It is interesting to note that the production for the 26 years from 1886 to 1912 has exceeded that of the previous 394 years.

The gold-producing countries mentioned in order of their importance, and the percentage

of their output in 1911 as compared with the total output, were: Africa, 41.5 per cent; United States, 21 per cent; Australia, 13 per cent; Russia, 7 per cent; and Mexico, 5.3 per cent, leaving a balance of 12.2 per cent for the remaining countries of the world. Brazil, which has been only slightly explored, showed a large percentage of increase in 1911 over that of 1910, and very extensive mining developments which were in progress in Chile in 1914 it was thought would probably result in considerable increase in the production from these countries in the near future. The table on page 97, giving the gold output from the various countries of the world, is taken from the Report of the United States Mint for 1912.

**United States.** In the United States, as elsewhere, the occurrence of gold is limited to areas of crustal and volcanic disturbances, these apparently being the prime factors that govern the formation of ore bodies the world over. There are, thus, two distinct regions in which gold is produced—the eastern region along the Appalachian Mountains, and the western, or Cordilleran, region. Gold has been found at numerous localities on the eastern slope of the Appalachians, and the mountain system might be said to be gold-bearing throughout its extent from Newfoundland to Alabama, although workable deposits occur only in Nova Scotia, Canada, and the Southern States. In the United States the auriferous belt, varying from a few miles to 75 miles in width, extends from Virginia through North Carolina, South Carolina, and Georgia, into Alabama. Both veins and surface deposits are worked. The veins of auriferous quartz cut through the slates and schists, generally forming only small pockets of ore. Associated with the gold is usually a small percentage of the sulphides of copper and iron. Some pockets of ore are exceptionally rich, and specimens of quartz literally covered with gold are to be found. The Haile gold mine in South Carolina, no longer worked, was a large low-grade body of auriferous schist; this mine was operated for a number of years and attracted considerable attention. It was at this property that the Keith lead-lined chlorination barrel for the extraction of gold was developed. The Dahlonega district in Georgia has also attracted considerable attention, and placer or surface mines have been worked in this district. In North Carolina the tendency is for the gold to occur in quartz veins. The first gold shipped to the mint for coinage from the Southern States was from North Carolina in 1804. For 20 years following, the annual output from North Carolina did not exceed \$2500. In 1829 Virginia and South Carolina, in 1830 Georgia, in 1831 Alabama and Tennessee, and in 1868 Maryland, shipped gold to the mint for coinage. Since then the production, although small, has been fairly constant.

The Western gold fields are scattered over the whole region between the eastern foothills of the Rocky Mountains and the western slopes of the Sierra Nevada and Cascade ranges and extend from Alaska into Mexico. In 1848 gold was first discovered in California in an excavation made for the tailrace to a water-power mill. This discovery caused the gold-rush excitement of '49, when men from all parts of the world rushed by boats and by wagons across the prairies to the new gold district. The wonderful richness of this new discovery furnished the in-

## GOLD PRODUCTION OF THE WORLD

COUNTRIES	Troy ounces 1909	Troy ounces 1910	Troy ounces 1911	Value 1911	Value 1912	Value 1913
North America						
United States . . . . .	4,821,701	4,657,017	4,687,053	\$96,890,000	\$93,451,500	\$88,301,000
Canada . . . . .	453,865	493,707	472,241	9,762,100	12,649,000	15,250,000
Mexico . . . . .	1,153,400	1,205,051	1,203,573	24,880,100	24,500,000	20,500,000
Cuba . . . . .	153,400	153,400	967	20,000		
Africa . . . . .	8,271,575	8,474,809	9,265,672	191,538,400	213,800,000	207,700,000
Australia . . . . .	3,435,007	3,167,140	2,911,410	60,184,200	54,509,400	55,474,500
Europe						
Russia . . . . .	1,566,443	1,721,163	1,555,333	32,151,600	22,199,000	22,199,000
Austria-Hungary . . . . .	93,446	105,101	105,705	2,185,100	2,043,000	2,043,000
Germany . . . . .	3,448	3,042	3,042	62,900	78,100	78,000
Sweden . . . . .	491	95	95	20,300	20,300	20,000
Italy . . . . .	1,168	1,430	2,165	44,800	11,000	11,000
France . . . . .	67,754	82,580	82,580	1,707,100	1,812,000	1,812,000
Servia . . . . .	7,273	7,273	12,833	265,300	251,000	250,000
South America						
Argentina . . . . .	9,186	8,372	13,979	289,000	107,300	107,800
Bolivia } . . . . .	23,819	22,429	11,517	238,100	175,000	175,000
Chile } . . . . .						
Colombia . . . . .	153,826	163,022	153,941	3,167,800	2,971,700	2,971,700
Ecuador . . . . .	13,273	12,054	13,389	276,800	406,500	406,000
Brazil . . . . .	108,983	94,557	185,496	3,834,500	3,570,000	3,570,000
Venezuela . . . . .	13,576	16,472	17,648	364,800	625,500	625,500
Guiana . . . . .						
British . . . . .	57,697	57,697	43,149	892,000	879,000	879,000
Dutch . . . . .	30,041	38,344	25,320	523,400	407,000	407,000
French . . . . .	103,708	107,835	107,835	2,229,100	3,050,000	3,050,000
Peru . . . . .	24,890	22,055	22,655	455,900	492,200	492,000
Uruguay . . . . .	4,433	4,433	3,422	70,600	111,000	111,000
Central America . . . . .	127,229	225,302	162,588	3,360,400	3,030,500	3,030,000
Asia						
Japan . . . . .	174,966	189,837	193,865	4,007,500	4,467,000	4,467,000
China . . . . .	452,406	176,960	160,344	3,314,600	3,658,000	3,658,000
Indo-China . . . . .	3,174	2,655	2,655	55,000	74,700	74,000
Chosen (Korea) . . . . .	96,440	212,808	139,774	2,889,400	2,852,000	2,852,000
Siam . . . . .	15,850	2,733	2,733	56,500	56,000	56,000
British India . . . . .	501,097	518,502	534,744	11,054,100	11,055,700	12,144,200
East Indies . . . . .						
British . . . . .	60,510	69,988	64,791	1,339,400	1,352,000	1,352,000
Dutch . . . . .	103,832	163,852	103,852	3,387,100	3,387,000	3,387,000
Total . . . . .	21,965,111	22,023,178	22,327,088	\$461,542,100	\$466,136,000	\$455,533,000

centive for the exploration and development of the whole Far West.

The accompanying statistics for the Appalachian States are taken from the Annual Report of the Director of the Mint for 1912:

GOLD PRODUCTION, APPALACHIAN STATES,  
1799 TO 1912

STATES	Total production	Annual average, 1902-1911	Production, 1912
Alabama . . . . .	\$724,772	\$25,120	\$16,400
Georgia . . . . .	17,671,915	60,912	10,900
Maryland . . . . .	73,350	2,272	1,200
North Carolina . . . . .	22,641,589	88,197	156,000
South Carolina . . . . .	5,856,258	73,113	15,400
Tennessee . . . . .	214,697	3,513	11,500
Virginia . . . . .	3,288,997	4,721	300
Total . . . . .	\$50,277,881	\$257,848	\$211,700

The gold occurs in three types of deposits—river gravels, or placers, high gravels, and veins. The river gravels, found in the beds of the numerous streams that flow down the western slopes of the Sierras, have been derived from the higher levels, where the erosive processes have cut deeply into the auriferous rock formations. Most of the gold is generally found near bed rock, and it is necessary to remove a heavy overburden before the values can be obtained.

The gold particles vary from minute pellets or dust to nuggets of considerable size. The high gravels represent the work of ancient rivers whose channels are more or less parallel to those of the present day, but have been filled in with detrital materials and frequently buried beneath lava flows. They lie along the higher slopes of the Sierras up to 5000 feet above sea level and sometimes attain a thickness of 500 feet. The veins, which have furnished the gold found in both the placers and high gravels, occupy fissures in slates, schists, and igneous rocks, and are of variable extent and richness. Quartz is generally the gangue material, while the gold occurs in a free state or combined with sulphides, most commonly pyrites. A great series of these veins, called the "mother lode," extends across Tuolumne, Calaveras, Amador, and El Dorado counties; for a number of years it has been the source of much of the gold mined in the State. The Comstock Lode (q.v.) is situated on an eastern spur of the Sierras, extending into Nevada. Placers and veins similar to those of the Sierras are found also in Oregon and Washington.

The Rocky Mountains and the outlying ranges, which were first prospected by Californian miners in the early sixties, include an immense area of gold-bearing territory. Rich gravels have been worked near Leadville, Fairplay, and in San Miguel Co., Colo.; near Helena and Butte, Mont.; along the Snake and Salmon rivers,

Idaho; near Deadwood, S. Dak.; at Santa Fe, N. Mex.; and in Alaska. The output from the gravels, although large, amounted to only 24.22 per cent of the total output for 1911, as shown in the accompanying table:

#### PRODUCTION IN THE UNITED STATES IN 1912

STATES*	Troy ounces	Value
Alaska.....	831,981	\$17,198,800
Arizona.....	183,117	3,785,400
California.....	967,887	20,608,000
Colorado.....	906,066	18,741,200
Montana.....	179,871	3,707,900
Nevada.....	656,772	13,575,700
South Dakota.....	378,476	7,823,700
Utah.....	208,093	4,312,600
14 other States.....	299,823	7,698,400
Total.....	4,520,719	\$93,451,900

SOURCE†	Troy ounces	Value
Deep mines.....	3,351,937	\$72,321,000
Placers.....	570,865	21,160,000
Total.....	4,520,719	\$93,481,500

\* From Bureau of Mint Report, 1912.

† From United States Geological Survey.

The percentage of gold produced by the different States from deep mining requiring metallurgical treatment, and from residual deposits requiring only washing, is given in the accompanying table. In this table it will be noticed that Alaska produced 53.5 per cent, and California 38.3 per cent, of the total residual or placer gold produced in 1911.

#### PERCENTAGE OF PRODUCTION BASED ON SOURCE, 1911

STATES	Deep mining	Dredging placers	Other placers	Total placers
Alaska.....	5.9%	14.5%	84.3%	53.5%
California.....	14.0	74.4	10.0	38.3
Colorado.....	25.4	2.6	.4	..
Nevada.....	24.5	..	1.5	..
South Dakota.....	10.0	..	..	..
Utah.....	6.3	..	..	..
Other States.....	13.9	8.5	3.8	8.2
Total.....	100.0%	100.0%	100.0%	100.0%

The total output of the mines of the United States was in 1913 approximately \$88,000,000.

California during 1911 produced 20.8 per cent of the total output of gold in the United States. Of this 54.5 per cent was recovered from deep mining and 45.5 per cent from placer. The output was derived from 1181 mines operating in 32 counties. The largest county production came from Yuba County, mainly from dredging operations. In deep mining the most productive in gold was Amador County.

Colorado during 1911 produced 19.7 per cent of the total output of gold from the United States. Cripple Creek, which has been one of the rich and large American producers, contributed 59 per cent of this production. This district became prominent in 1894, when the Independence mine was discovered. The ores were exceptionally high grade, the gold occurred in combination with tellurium, resembling silver, and the deposits were large. In 1905 approxi-

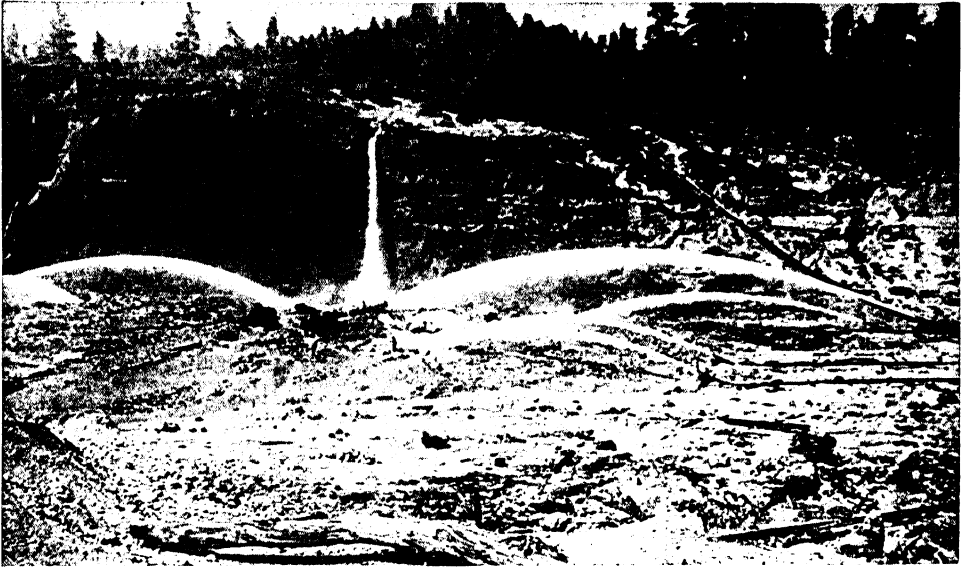
mately \$18,000,000 in gold was produced. The district has been a heavy producer and is now treating successfully low-grade ores by concentration and cyaniding by a special process developed by Philip Argall, of Denver, for handling this particular ore. The San Juan district, in which the famous Camp Bird mine is located, in 1912 produced \$4,119,191 as against \$5,035,610 in 1911, \$5,822,422 in 1910, and \$6,170,201 in 1909; no new discoveries have been made in this district. The placer output amounts to only about 2 per cent of the total output of the State.

Nevada during 1911 produced 18.7 per cent of the total output of gold in the United States. About 50 per cent of the output was from Goldfields in Esmeralda County and 25 per cent from Tonopah in Nye County. Most of the ore is from deep mining, and the gold is recovered by amalgamation and cyaniding. The Tonopah mine, discovered about 1902, caused the rush to Nevada which resulted in the development of the Tonopah district and the discovery and development of the Goldfields district. Exceptionally high-grade ore was produced in the Goldfields district. The output from Nevada has been decreasing; the largest decrease was from the mines of the Goldfields district; in 1911 this decrease amounted to \$850,000 and in 1912 to \$4,047,000. The output from the State in 1912 was \$13,456,000 as compared with \$18,097,000 for 1911.

Alaska during 1911 produced 17.2 per cent of the total gold output of the United States, amounting to \$16,665,200. In 1912 the production amounted to \$17,145,951. About three-fifths of the output was from placers, but the ratio of output of placer gold to lode gold was decreasing as the richer gravels were being worked out and the deep or lode mines were being developed. During 1911 the recovery of placer gold per cubic yard amounted to \$2.17, and during 1912 this recovery was reduced to \$1.87. With the increased application of dredging the output of placer gold will probably be maintained for many years. The recovery per cubic yard from dredging during 1912 amounted to from 52 to 64 cents. The total output of placer gold during 1912 amounted to \$11,990,000 as compared with \$12,540,000 for 1911. The total output of gold from quartz mines in 1912 amounted to \$5,002,000 as compared with \$4,227,000 for 1911; of this output the low-grade mines of the Alaska-Treadwell Company, on Douglas Island, produced \$4,418,000 in 1912 as compared with \$3,904,000 for 1911. At Juneau, only a few miles east of the Alaska-Treadwell, on the mainland, very extensive developments were being completed in 1914 for the mining and milling of a large deposit of low-grade ore. This mill was to be in operation in 1915 and should affect considerably the output of gold from Alaska. Since 1882 and up to 1912 the lode or deep mines of Alaska have produced \$57,811,000, and the placer mines, \$157,800,000.

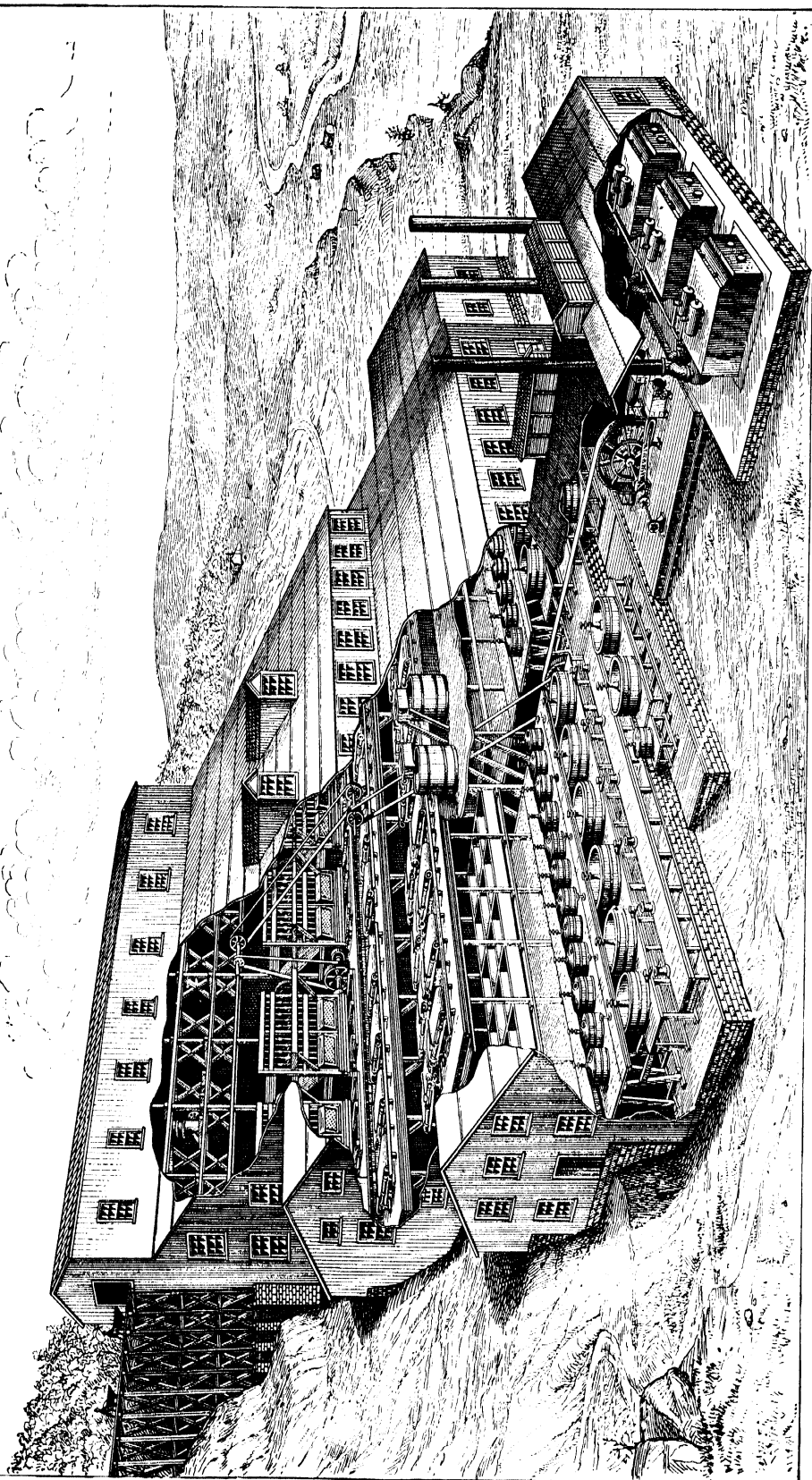
South Dakota was maintaining its output of gold from the low-grade ores of the Black Hills, with the indication that it probably would continue to do so for many years to come. The yield is wholly from siliceous ores. Mining and metallurgical practice of the highest grade have been characteristic of the successful operations, and particularly was this true of the Homestake mines, which have produced the bulk of the output. The milling practice consists of amalgamation followed by cyaniding. The total

## GOLD MINING





GOLD MINING



A COMBINATION STAMP MILL AND EXTRACTION PLANT



output of gold from South Dakota from 1875 to 1912 inclusive was \$170,634,838, and the yield during 1912 amounted to \$7,891,370, which was the largest ever recorded from the State.

The States above discussed produced about 84 per cent of the total output during 1911. There are numerous smaller fields located in Utah, Montana, Arizona, and elsewhere, which in the aggregate produce about 16 per cent of the output, of which a large percentage is recovered from the smelting of copper, lead, and zinc ores.

The total output of the mines of the United States in 1913 was approximately \$88,000,000.

**Africa.** The gold production for 1911 amounted to \$191,538,433. Of this amount the Transvaal produced \$170,566,159; West Coast, \$5,601,117; French Colonies, \$1,865,349; and Rhodesia, \$13,505,808. The production on the Transvaal was the largest in its history. It was reported that some of the shallow mines which are worked from the surface croppings would soon be worked out and that a few of the first deep mines have only a short life left. With the development of the "deep-deep" mines the cost of mining would increase, and this to some extent has been balanced by the reduction in total cost of operation by consolidating many properties and the building of large central mills for the recovery of the gold. The deposit consists of a conglomerate commonly called a "banket," varying from a few inches to several feet in thickness. It can be traced for several miles along the strike and for several thousand feet has retained its auriferous tenor in depth. From 1889 up to and including 1911 the Transvaal has produced over \$1,582,000,000.

**Australasia.** The large output from alluvial deposits which first attracted the miner has largely been replaced by quartz mining due to exhaustion. The most productive states are Western Australia, with an output for 1911 of \$28,337,994; Victoria, \$10,418,471; New Zealand, \$8,834,712; Queensland, \$7,744,056; and New South Wales, \$3,744,056. The average value of ore treated in Western Australia during 1911 was \$10.009 as against \$10.080 for 1910; in the East Coolgardie gold fields, from which comes over 50 per cent of the states' yield, the grade per ton has fallen from \$9.798 to \$9.268. The yield of gold obtained by dredging in New South Wales amounted to \$99,245, showing a decrease from previous records.

**Russia.** Most of the gold produced by Russia has been obtained from placer workings on the eastern slope of the Ural Mountains. During 1911 mining was stimulated by the high price of platinum, and the year was one of general progress in precious-metal mining. In total gold production Russia and Siberia rank third, being surpassed by the United States and Australasia, but still remaining ahead of South Africa.

**British North America.** During 1911 British Columbia produced \$4,930,150; of this the placer production amounted to only \$468,000, and the balance was recovered from smelting of base-metal ores containing gold and also from milling quartz-gold ores. The Yukon district produced \$4,930,150, of which \$4,580,000 was recovered from placers. The production from Nova Scotia milling ores was estimated at \$142,000. The gold veins of Nova Scotia are quite similar to those of the Southern States in the United States; no large ore bodies have been discovered. Quebec produces very little gold. It is interesting to note that the gold output of Ontario in

1911 was only \$42,625 as compared with the large output of silver from the Cobalt district for the same year, amounting to \$16,492,000. The Cobalt district was discovered by a blacksmith working on the building of the Temiskaming and Northern Ontario Railroad. This railroad was constructed to develop the lands in northern Ontario; its terminus was just north of Cobalt. A few years later the government started the extension of this line, and the prospectors preceded the construction. In 1909 the discovery of rich gold veins in Porcupine was reported, and long before the snow had gone in the spring of 1910 the district was filled with prospectors. During 1911 claims changed hands at high figures, with no other showing than the snow or possibly a "rock cropping." Mills were freighted in and boilers shipped by express to the end of the railroad so that they could be hauled over the snow and frozen lakes before the spring thaw and "break up." The summer of 1911 saw the entire district, mills and equipment, wiped out by a forest fire, with a heavy toll of life. In 1912 the two large mines, the Hollinger and the Dome, dropped their stamps for the first time and commenced the regular production of gold. The output from the Porcupine district was as follows: 1910, \$35,539; 1911, \$17,187; 1912, \$1,731,000; and 1913, \$4,285,000.

#### GOLD MINING

Gold-mining operations may be divided into two classes—placer mining, where the gold occurs in river beds or ancient river beds and in the native state scattered through sand and gravel; and vein or quartz mining, where the gold occurs native or associated with sulphides in a vein or ore body. Placer mining may again be subdivided into hydraulic mining and dredging, depending on the method used in excavating the gravel.

**Hydraulic Placer Mining.** This method of mining was first attempted in a crude way in 1852 in Placer Co., Cal., and was largely practiced until laws were passed practically prohibiting this method in the State. This method is now largely followed in Alaska, as the conditions leading to suppression in California did not exist in that territory. In 1912 California produced only 10 per cent of the total output of hydraulic placer gold, whereas Alaska produced 84.3 per cent. In California the hydraulic mining has largely been replaced by dredging. Briefly described, hydraulic mining consists of directing a powerful stream of water under a heavy head through a "giant" (nozzle) against the gold-bearing gravel bank, which breaks down the material and washes it away through specially constructed sluices, where the gold is saved. The sluices are large and built of heavy material to withstand the pounding of heavy boulders washed through them. The first length of sluice terminates with a grizzly, or screen, consisting of parallel bars of iron; the large boulders are removed at this point, and the smaller material carrying the gold passes through the grizzly into the second section of sluices. In this section are placed specially designed riffles to permit the coarser gold to settle from the gravel. At intervals the bottom of the sluice is replaced by a grating or grizzly to permit the finer material to go through and enter sluices which are built at right angles to the main sluice; in these cross sluices riffles

are also placed to catch the gold. Mercury is added behind the riffles to amalgamate with the gold and prevent its washing away. When conditions are favorable *ground-sluicing* is sometimes resorted to. In this process a stream or portion of a stream is diverted and caused to flow steeply and rapidly across the placer bed, eroding and bearing away large quantities of gravel. In the pit where the speed of the current diminishes, one or more giants serve to sweep the gravel into the sluice boxes.

**Dredging.** On rivers, or where hydraulic mining is prohibited, dredges are used. These consist of flat-bottomed boats which carry the necessary machinery for excavating the gravel and recovering the gold. When dredges are used on dry placers, or deposits away from the river, it is necessary first to dig a hole of sufficient size in which to build the dredge. Provision must be made to supply the dredge with a constant stream of water sufficient to float it and furnish the water which is lost in discharging the wet tailings at the rear. The dredge is equipped with powerful machinery, large excavating buckets closely attached to an endless chain consisting of large heavy bars of iron, a heavy cylindrical screen for separating the large boulders and discharging them over the side of the boat, sluices quite similar to those used in hydraulic mining, and a tailings stacker at the stern of the boat which disposes of the gravel after the gold has been recovered. This method of placer mining is largely practiced in Australia and California, and is rapidly being introduced into Alaska and Central America.

**Quartz Mining.** The mining of gold veins is conducted in much the same way as that of other metalliferous veins. Shafts are sunk, drifts are driven laterally on the vein from the shafts, and the method of breaking and handling the ore is determined by the size of the ore body, inclination or dip, and local conditions. In a few cases tunnels on the ore body are driven, or cross-cut tunnels through the barren rock are driven to the ore body. After the ore body is opened up or developed, the ore is blasted, loaded into cars, trammed or transported to the shaft, and hoisted to the surface, where the ore is delivered for metallurgical treatment.

#### METALLURGY

The method of extracting gold from the ores depends on the character of the ore and the location of the property. Heavy gold sulphide ores, such as copper, lead, etc., are smelted. Ores containing only a small percentage of sulphides with free gold or gold finely disseminated in the sulphides are usually treated at the property by amalgamation or cyaniding, or a combination of both. Progress has been very rapid in recent years, and processes such as the chlorination have been almost, if not wholly, replaced by the cyanide process. The reader is referred to publications on gold metallurgy for detailed descriptions of these several processes. Briefly, the chlorination process consists of converting the insoluble gold into the soluble chloride of gold, leaching with water, and precipitating the gold with a suitable precipitant, such as charcoal, sulphate of iron, or sulphuretted hydrogen.

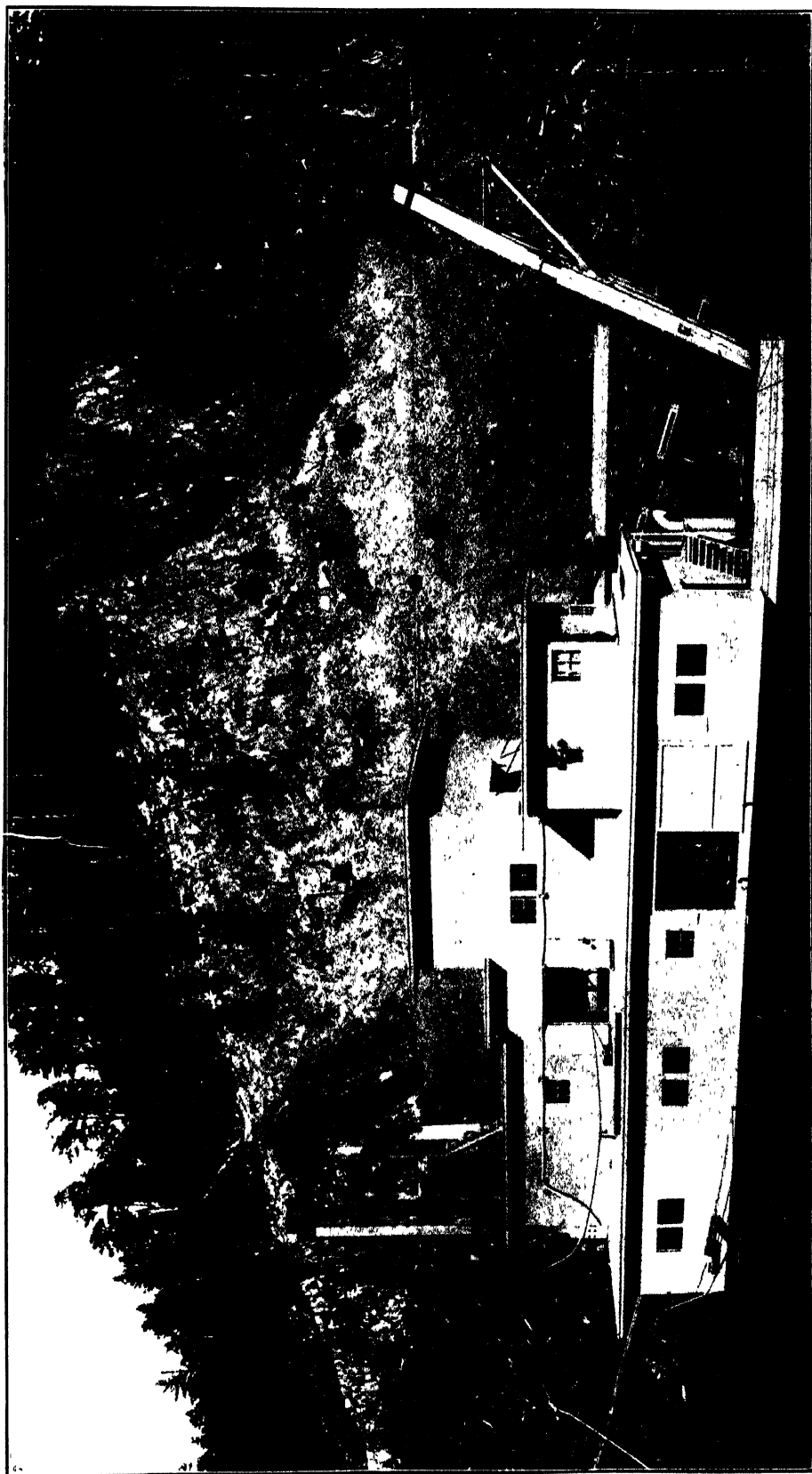
**Stamp Milling and Amalgamation.** This process, which is the oldest method of crushing ores for the extraction of gold, is still in use to-day, and the modern stamp mill owes much

to South Africa for its existence. It has been threatened many times by new machines and in many cases of gold milling has been replaced; where amalgamation is necessary for the recovery of the gold, or a portion of the gold, the stamp mill is always found as the preliminary crusher. (For a detailed description of the construction of the stamp mill, see GRINDING, CRUSHING, AND PULVERIZING MACHINERY.)

The stamp mill is usually the preliminary crusher to amalgamation; the ore, as delivered from the mine cars, first enters the ore bin, from which it is fed to breakers and broken to fragments about 1½ to 2 inches in size; from the breakers the ore is again transported to the ore bins immediately in the rear of the stamp mill; from these bins the ore is fed mechanically, together with a stream of water, to the stamp mill to be crushed; and the crushed product is splashed through a screen to the amalgamated plates, or apron plates, placed directly in front of the mill for recovery of the gold by amalgamation. The process of extraction by amalgamation consists of crushing the ore sufficiently fine to liberate or free the native gold and then catch the gold in mercury. The gold does not combine chemically with the mercury, but amalgamates with it, forming a stiff pasty mass known as amalgam. In stamp milling, copper or silver-plated copper plates covered with mercury are used for catching the gold. The plates may be located inside of the stamp battery or housing surrounding the stamps, suspended in front of the discharge screen, when it is known as the splash plate, and in front of the stamp battery, placed at a slight angle to permit the pulverized ore to be washed over; in the latter case they are known as apron plates. The length of the apron plates varies greatly, but the width is regulated by the width of the mortar. To prepare the amalgamating plates they are first thoroughly washed, and all grease spots, if any, removed; mercury is then sprinkled on and rubbed into the plate—with copper plates sodium amalgam is often used for this purpose; all excess of mercury is removed with a stiff brush; this leaves the plates bright with a thin coating of mercury. The pulverized ore is then washed across the plates from the stamp battery, and the free or native gold adheres to the mercury; more mercury is sprinkled on the plates as required. At certain periods the amalgam is scraped off the plates and the gold separated, as described later.

Pan amalgamation has been largely used, but at present it has been replaced to a large extent by other processes. Pan amalgamation consists of feeding comparatively fine ore or concentrates to a grinding pan, adding the proper amount of mercury, and pulverizing the ore in close contact with the mercury; following this operation, the grinding muller is raised off the bottom, the pulp diluted, and more mercury added to collect any suspended amalgam; the amalgam sinks to the bottom of the pan and is drawn off. Investigations have shown that amalgam containing coarse gold carries a higher percentage of gold than that containing fine gold, although the physical characteristics appear to be the same. In recovering the gold from the mercury the amalgam is placed in a large wedgwood mortar, more mercury added to reduce the plasticity, and then hot water is added, and the amalgam washed by working with the pestle; sand and foreign matter is by

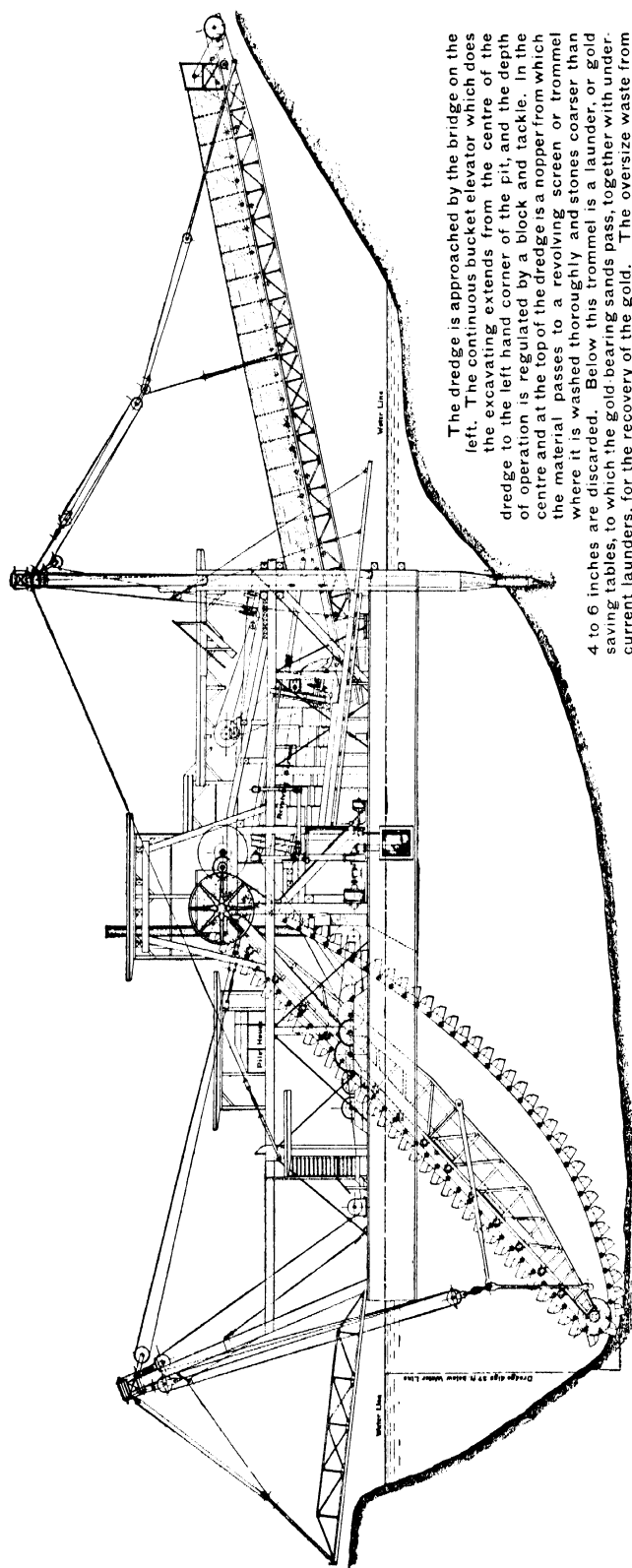
## GOLD MINING



A GOLD DREDGE

THE ABOVE VIEW ILLUSTRATES THE METHOD OF MINING THE GOLD-BEARING SANDS SITUATED ALONG RIVER AND CREEK BOTTOMS IN SUCH REGIONS AS ALASKA AND CALIFORNIA. THE DREDGE ILLUSTRATED IS OF FIVE CUBIC FEET CAPACITY OF THE CONTINUOUS BUCKET ELEVATOR TYPE, AND IS CAPABLE OF DIGGING THIRTY SEVEN FEET BELOW THE WATER LINE

# GOLD MINING



The dredge is approached by the bridge on the left. The continuous bucket elevator which does the excavating extends from the centre of the dredge to the left hand corner of the pit, and the depth of operation is regulated by a block and tackle. In the centre and at the top of the dredge is a nopper from which the material passes to a revolving screen or trommel where it is washed thoroughly and stones coarser than 4 to 6 inches are discarded. Below this trommel is a launder, or gold saving tables, to which the gold bearing sands pass, together with undercurrent launders, for the recovery of the gold. The oversize waste from the trommel is discharged from the side of the dredge into the pit; the under-size from the trommel, after the gold has been extracted, is delivered to the tailings stacker consisting of an endless belt, shown on the extreme right. The dredge is held in position or anchored by means of a spud located at the stern of the dredge; the position of the bow is changed by means of two guy lines fastened to stakes in the ground in front of the dredge.

CROSS-SECTION OF A MODERN ELECTRICALLY-DRIVEN GOLD DREDGE, SHOWING METHOD OF OPERATION

this means removed. The clean amalgam is then placed in a chamois bag, and the excess mercury squeezed out, leaving a hard amalgam; this hard amalgam is made into balls, covered with paper to prevent the gold sticking to adjacent balls or the sides of the iron retort, and retorted. The temperature of the retort is slowly increased so as to prevent too rapid distillation of the mercury. The mercury vapor is passed through condensing tubes and recovered. The remaining gold is then melted into bars, assayed, and shipped to the mint. The purity of the gold brick is reported in parts in 1000, such as 627 fine in gold, and 258 fine in silver; the balance of 115 would represent base metal, such as copper. The pulverized rock from the stamp mill, after being washed across the apron plates, is known as plate tailings. In most cases the plate tailings contain sufficient gold to warrant further treatment. The method adopted to recover this gold depends upon the value and character of the tailings. When the ore contains auriferous sulphides, the tailings are usually concentrated; when the tailings are comparatively free from sulphides, the gold is usually extracted by dissolving it in cyanide solution; in many cases a combination of concentration followed by cyaniding is used. The concentrates produced are either shipped to the smelter or treated on the property, depending on local conditions.

**Cyanide Process.** That gold was soluble in cyanide solution had been known for many years before a commercial process based on this principle was developed for recovering the metal from the ores. The first attempt to use this process commercially was made by J. H. Rae, who secured patents from the United States in 1867; Rae's process made use of the electric current in connection with a solution of cyanide salts. In 1885 J. W. Simpson, of New Jersey, proposed using a 3 per cent solution of cyanide together with a small percentage of ammonium carbonate. In the following year (1886) J. S. MacArthur and R. W. and William Forrest, of Glasgow, started their experiments and were finally successful in commercializing the process which for many years was known as the MacArthur-Forrest process. It was in 1890 that the MacArthur-Forrest process was introduced into South Africa to replace the chlorination process, which up to that time had been the standard method of extracting gold. The chief advantages which the cyanide process offered over the chlorination process were reduction in cost of operation by eliminating the preliminary roasting and the recovery of the silver with the gold by one leaching. The process is dependent upon the fact that very fine particles of gold, or exceedingly fine sheets of gold, are rapidly soluble in a weak solution of potassium cyanide in the presence of free oxygen; coarse gold is practically insoluble in such a solution, as it is necessary to bring in contact with the gold free oxygen for the reaction to take place. At first solutions containing from 1 to 2 per cent of potassium cyanide were used, but it was soon found that weaker solutions dissolved the gold in practically the same length of time and greatly reduced the cost of chemicals required; the first, or the strong solutions, now vary from 0.1 to 0.2 per cent, depending on local conditions. It was in South Africa that this process was commercially developed, and the first few volumes of the *Transactions of the*

*South African Mining Society* are mostly confined to the cyaniding process.

The process as developed in South Africa consisted of stamp milling followed by amalgamation; the tailings from the amalgamating plates were then classified into sands and slimes and treated separately. The sands were conveyed into large cylindrical shallow tanks holding many tons; the cyanide solution was then introduced under pressure through the bottom of the tank and allowed to permeate the sands until the surface of the tank was covered with solution; after a few hours the solution was drawn from the bottom of the tank and fresh solution added to the top of the tank. After such treatment for several days, wash water was added to the top of the tank to replace the gold solution and wash the sands of any dissolved gold. The slimes were conveyed to large settling tanks and allowed to settle, followed by decantation of the water; cyanide solution was then added, and the slimes agitated by mechanical means for several hours, allowed to settle, and the gold-bearing cyanide solution decanted. This operation was repeated until the soluble gold had been extracted from the slimes. Following this treatment, the slimes were washed as free as possible of any dissolved gold. This method of treating the slimes required large tankage and considerable time, and was soon improved upon in the United States by the invention of the Moore filter, and many other filters using the principle suggested by George Moore.

The Moore process consists of adding cyanide solution to the slimes, conveying the slimes to a filter tank, collecting a cake of slimes on the filter leaves by vacuum, transferring the filter leaves containing the cake, while the vacuum is on, to a second tank containing wash water, replacing the gold solutions in the slimes by wash water, and finally transferring the leaves containing the washed filter cake to a third tank, where the slimes are discharged from the filter leaves by introducing compressed air into the leaf in place of the vacuum. By this process the original tankage investment has been minimized and a much better extraction obtained from the slimes. Recently this latter process has been greatly improved by the introduction of the Dorr countercurrent settling tanks, followed by the Moore-Oliver filter. These tanks are the invention of J. V. N. Dorr and have met with success throughout the United States. In this process the slimes travel through a series of tanks in an opposite direction to the cyanide solution, and the process is known as the Dorr countercurrent cyanide process. The slimes from the last tank are thickened and fed to a rotary filter. This rotary filter is a large revolving cylinder the surface of which consists of vacuum chambers connected to a central vacuum and pressure valve on the shaft. The vacuum chambers are covered with woven wire, cocoa matting, canvas, and wound spirally with wire. The surface of the cylinder with the vacuum attached is slightly immersed in the thickened slimes; the slimes adhering to the cylinder are elevated by the revolving of the cylinder, washed with a spray of water near the top of the cylinder, and are discharged after washing by a scraper; immediately preceding the scraper the vacuum is replaced by compressed air. The advantage which this process offers is that it is continuous and less expensive to operate. The soluble gold and silver go

into solution as a double cyanide with the potash. The gold from this solution is extracted by passing the solution over zinc shavings. In many mills this method of precipitation has been replaced by the introduction of zinc dust into the cyanide solution as it is conveyed to filter presses. The gold and silver are precipitated as a fine black powder. This precipitate is then treated with dilute sulphuric acid to dissolve any small pieces of zinc and pumped to a filter press. The cake obtained in the filter press, consisting of practically pure gold and silver, is then dried, mixed with the proper fluxes, and melted in graphite crucibles. The gold and silver obtained after melting is cast into bars and shipped to the mint.

**Extraction by Washing.** Extraction of gold by washing alone is possible only in the case of ores carrying native gold. Hydraulic mining and dredging are the two commercial methods. Hand operations are only practiced when the pockets of ore are very rich and too small to warrant the erection of a plant; a mine of this character was being operated in Australia in 1912. For testing the value of placer ground the gravel obtained from drilling is washed by hand; prospectors also make use of the "gold pan" to test samples and specimens of rock for free gold. In uncivilized countries hand washing is often practiced. Unless carefully conducted the losses by hand washing are liable to be very heavy. Hand washing may be performed by means of pans, cradles, long toms, and sluices. The operation of panning is the simplest and consists of placing the material in a flat-bottomed pan, known as a "gold pan," the sides of which slope at an angle of about 60°. The pan is then placed under the surface of the water, and an oscillating motion given to it, so that the free gold will settle, and the mud and fine sand will wash over the edge, which is gradually lowered until there is little left in the pan other than the heavy minerals and gold. The pan is then lifted and shaken so as to spread out the material, when the yellow specks, or "colors," of gold are visible. The cradle is a box provided with a sieve at the feed end, the whole resting on rockers so that it can be rocked by means of a handle. The gold-bearing mineral is placed on the sieve and washed with water, the coarse particles being removed from the sieve by hand and the fine particles, together with the gold, passing through and falling on an inclined bottom, where the light material runs off with the water, and the heavier gold sinks to the bottom and is retained by transverse slats known as riffles. The long tom consists of two troughs, the lower one of which has cross riffles on its inclined bottom. The upper trough is about 14 feet long by 20 inches wide at the upper end and 30 inches wide at the lower end, which is closed by a sieve. The lower end of the upper trough discharges into the upper end of the lower trough. The lower trough is about 12 feet long by 3 feet wide, and by means of a strong stream of water flowing in at the upper end of the upper trough the material is washed through both troughs, the gold being caught in the riffles in the lower box and the coarse material being discharged by hand from the upper box.

**Parting.** As the greater part of the gold produced by the preceding processes carries silver (see SILVER), the parting of the gold from the silver is an important process in the metallurgy of gold. Parting is performed in what are

known as the dry way and the wet way and by electrolysis. The dry method of parting depends upon the fact that silver can be converted into sulphide or chloride, while gold is attacked by neither sulphur nor chlorine at high temperature. The wet method depends upon the solubility of silver and the insolubility of gold in nitric acid and in boiling concentrated sulphuric acid. The electrolytic method depends upon the property of silver to pass from a bar of gold-silver alloy employed as an anode to the cathode, when the two poles are immersed in an acidulated solution of nitrate of silver, and an electric current established. The wet process, using sulphuric acid as the solvent, and the electrolytic process are the two parting processes most employed at present. For a full treatment of the metallurgy of gold, consult Schnabel, *Handbook of Metallurgy*, translated (New York, 1889), and Egleston, *The Metallurgy of Silver, Gold, and Mercury in the United States* (ib., 1887).

**Commercial Uses.** It is estimated by competent authorities that about one-fourth of the annual production of gold is employed in coinage, the remainder being consumed in the arts and in making good the annual loss from various causes. The purposes for which gold is employed in the arts are familiar to every one. Some of the items are jewelry plate, gold leaf, gilding, etc.

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**GOLDAU**, gôl'dou. A village in the Canton of Schwyz, Switzerland. It was formerly situated between Mount Rigi and the Rossberg and was the scene of the terrible landslide from the Rossberg, Sept. 2, 1806, which destroyed Goldau and three other villages, burying 457 people and filling up part of Lauwerz Lake. The present village of Goldau, built near the mines, contains a population of about 500.

**GOLDBEATER'S SKIN.** A delicate membrane prepared from the cæcum, or blind gut, of the ox, and used as the fabric for court-plaster, etc., but chiefly by goldbeaters. The outer or peritoneal membrane is used for this purpose. The intestine is first subjected to a partial putrefaction, by which the adhesion of the membranes is sufficiently diminished to enable them to be separated; the separated membrane is then further cleaned from adhering muscular fibres, dried, beaten, and pressed between paper, besides being treated with camphor or alum, isinglass, and white of egg, the object of which is to obtain the pure continuous membrane free from grease and impurities and thus prevent weakening by putrefactive processes. When thus prepared, goldbeater's skin may be beaten continuously for several months with a 12-pound hammer without material injury. The intestines of about 380 oxen are required to furnish the 950 leaves that form one packet, or *mold*, as it is technically called. The manufacture is extremely offensive. Chlorine has been introduced both as a disinfectant and to assist in the separation of the membrane.

**GOLDBEATING.** The process by which gold is hammered into thin leaves. The use of gold leaf for gilding is a very ancient art, having been practiced by the Egyptians and Greeks many centuries before the Christian era, and gold used for this purpose is usually alloyed with silver or copper, according to the color required. The consumption of gold leaf by dentists is also general, as the material in this form is extensively used for fillings. As gold leaf is not sold by weight, but by superficial measure, and as increasing the quantity of alloy diminishes the malleability, there is but little temptation to use the baser metals as an adulteration. The gold, which is first alloyed with a small amount of pure copper and silver, 12 grains of each to the ounce of gold 998 fine, is first cast into oblong ingots or bars about 1 inch wide. The ingot or bar is flattened out into a ribbon of about  $\frac{1}{16}$  of an inch in thickness by passing it between polished steel rollers until it is about 24 feet long and weighs about 55 pennyweights. This is annealed or softened by heat, and then cut into 210 pieces approximately 1 inch square; these are placed between leaves of vellum or tough paper specially made in France, each piece of gold in the centre of a square leaf, another placed above, and so on till the pile of 210 is formed. This pile, called a *cutch*, is inclosed in a double parchment case, placed upon a marble block, and beaten with a 16-pound hammer. The elasticity of the packet considerably lightens the labor of beating, by causing the hammer to rebound with each blow.

The beating is continued until the inch pieces are spread out to  $3\frac{1}{2}$ -inch squares; they are then taken out and cut into four pieces. The squares thus produced are now placed between layers of goldbeater's skin (q.v.), instead of vellum, made into piles, and inclosed in a parchment case, and beaten as before, but with a lighter hammer weighing about 10 pounds. Another quartering and beating produces 3360 leaves, each with a thickness of about  $\frac{1}{1000}$  of an inch. An ounce of gold is thus extended to a surface of about 100 square feet. A still greater degree of thinness may be obtained, but not profitably. A thinness has been attained of 367,500 leaves to the square inch, and a

grain of gold is thus made to cover 52 square inches. After the last beating the leaves are taken up with wooden pincers, and a tool called a "wagon," placed on a cushion, blown out flat, and their ragged edges cut away, by which they are reduced to squares of  $3\frac{1}{4}$  inches. Twenty-five of these are placed between the leaves of a paper book, previously rubbed with red chalk to prevent adhesion of the gold, and are sold in this form, 20 books being included in a pack. It is stated that an amount of gold weighing 4 pennyweights 6 grains and worth \$4.25 commands at wholesale, in the form of a pack of gold leaf, about \$7.25. Attempts have been made to apply machinery to goldbeating, but its application is very limited; and most of the gold leaf is still beaten by hand.

**GOLD BUG, THE.** One of the most noted of Poe's tales (1843). The scene is the vicinity of Charleston, S. C., where a recluse, Legrand, locates an enormous treasure in gold and jewels by means of an intricate cipher found on an old parchment.

**GOLD CARP.** See GOLDFISH.

**GOLD COAST.** A British Crown colony in West Africa, extending along the Gulf of Guinea about 334 miles, and bounded by the French colony of the upper Senegal and Niger on the north (about the parallel of  $11^{\circ}$  N. lat.), Togoland on the east, and the French Ivory Coast on the west (Map: Africa, D 4). The area of the colony excluding the Northern Territory and Ashanti (q.v.) is estimated at 25,000 square miles; the total area, 80,253 square miles. The coast region is rather low, with rocky cliffs lining the shores and reaching a height of 2000 feet. The interior is mountainous. In the southeast is the Akuapem Range. South of it runs the Adanse Range, covered with dense forests and constituting a great natural barrier along the coast district. The western part of the interior is generally hilly; the eastern part is formed mainly of extensive terraces. The chief rivers flowing south are the Volta, which is a part of the German boundary line, the navigable Ankobra, emptying into the sea near Axim, the Pra, and the Toji. The climate of the colony, although not so deadly as that of the west coast, is very unhealthy for Europeans. April is the hottest month. There are two rainy seasons—from April to August and from October to the end of December. The rainfall varies along the coast, being heavy in the west, 79 inches per year, and light in the east, 27 inches. Impassable forests of palms, gum trees, and the giant karkum seriously interfere with the development of the interior. The level regions in the south, and the savannas north of the Akuapem Mountains, are overrun with herds of elephants, buffaloes, and other wild animals.

The soil is of great fertility, producing coffee, cacao, tobacco, cotton, and other tropical products. Agriculture has received little attention, but a botanical station at Aburi aids in the cultivation of colonial products—coconut, rubber, cocoa, coffee, cotton, pepper, nutmeg, pimento, and croton. The chief products are derived from the forests and mines. The trade of the colony is prosperous and increasing. Imports increased from £2,125,464 in 1902 to £4,023,322 in 1912, and exports from £774,186 to £4,307,802. In 1912 imports from the United Kingdom amounted to £2,622,932, and exports thereto, £2,680,973. The chief exports in 1911

were: cacao £1,613,468; gold and gold dust, £1,071,616; rubber, £219,447; palm kernels, £175,891; lumber, £138,821; palm oil, £128,916. Gold, both alluvial deposits and quartz, is widely diffused throughout the colony, Ashanti, and some parts of the Northern Territories. The output was 281,257 ounces (valued at £1,194,743) in 1908; 253,976 ounces (£1,079,024) in 1911; 352,957 ounces (£1,499,469) in 1912. Shipping entered and cleared in the foreign trade, in 1912, 2,849,248 tons. There is a government railway from Seccondee on the coast to Coomassie, 168 miles; and a line is in operation between Accra and Mangoase, 40 miles. Road construction is progressing rapidly. There are about 1500 miles of telegraph line, and at Accra is a wireless telegraph station. The colony is administered by a governor, and by an executive and legislative council, the members of which are chosen from officials and colonial merchants. The colony proper is divided into three provinces—Western, Central, and Eastern—each under a commissioner; Ashanti and the Northern Territories are each under a chief commissioner. Revenue and expenditure in 1902 were £511,502 and £547,607 respectively; in 1907, £708,718 and £617,124; in 1911, £1,111,632 and £914,501; in 1912, £1,230,850 and £1,157,091.

The negro inhabitants are divided into a large number of tribes more or less independent of each other, but with similar customs and forms of government. As education and civilization spread, there is an increasing tendency to tribal disintegration. The population in 1911 was probably in excess of the census returns of that year. The census disclosed 1,503,386 inhabitants, divided as follows: the colony, 853,766; Ashanti, 287,814; the Northern Territories, 361,806. Europeans numbered 1700. In 1912 there were 11 government primary schools and 148 assisted schools controlled by various Christian religious bodies; enrollment in primary and secondary schools, 18,524; average attendance, 14,113. The chief towns include Accra, the capital (pop., 19,585 in 1911), Coomassie, the capital of Ashanti (18,853), Cape Coast Castle (11,364), Seccondee (7725), Saltpond, Quittah, Winnebah, Akuse, Axim, and Abui. There are a large number of small towns, with populations ranging between 2000 and 5000.

The Gold Coast is thought to have been discovered by the Portuguese in 1470. In 1481 a Portuguese colony of about 700 men under Diogo d'Asambuja landed at the present seaport of Elmina, and erected the fort of St. George. The Dutch by 1642 had succeeded in driving away the Portuguese. Meanwhile the English began to arrive, but their first attempts at establishing themselves were frustrated by the Dutch. After the establishment of the Royal African Company in 1672, the English succeeded in erecting a number of forts on the coast and soon concluded an alliance with the Fanti, whose old enemies, the Ashanti, had allied themselves with the Dutch. The slave trade was the chief source of commerce. In 1821 the English possessions on the Gold Coast were taken out of the hands of the African Company of Merchants, who had succeeded the previous monopoly, and made a dependency of Sierra Leone. The Fanti, with the aid of the British, decisively defeated the Ashanti in 1826, and in 1831 the rule of England was recognized over the territory lying south of the upper Pra. In 1872 the Dutch ceded their holdings to the British for trading privileges,

and since then the rule of the English has been supreme in the Gold Coast. In 1874 the territory was made a crown colony distinct from Sierra Leone. For a further account, see ASHANTI. Consult: Macdonald, *The Gold Coast, Past and Present* (London, 1898); Reindorf, *History of the Gold Coast and Ashanti* (Basel, 1895); H. W. Redwar, *Comments on some Ordinances of the Gold Coast Colony* (London, 1909); John Lang, *The Land of the Golden Trade* (Edinburgh, 1913); C. P. Lucas, *Historical Geography of the British Colonies*, vol. iii (3d ed., Oxford, 1914).

**GOLD-CREST'** (so called from the yellow spot on its head), GOLDEN-CRESTED WREN, or FIRE-CREST. English names for European species of kinglets. See KINGLET.

**GOLDEN.** A city and the county seat of Jefferson Co., Colo., 16 miles by rail west of Denver, on Clear Creek, and on the Colorado and Southern and the Denver and Inter-Mountain railroads (Map: Colorado, D 2). It is the seat of the Colorado School of Mines, opened in 1874, and of the State Industrial School for boys. There are extensive deposits of coal and clay in the vicinity, and the city has smelting works, a brewery, and manufactures of pressed and fire brick, tile, pottery, flour, etc. The water works are owned by the city. Pop., 1900, 2152; 1910, 2477.

**GOLDEN AGE.** In Greek and Roman mythology the earliest of the four ages; the ideal period when the earth, under Saturn's reign, produced fruits without cultivation, when there was no warfare, and man lived in perfect happiness before sin entered the world. The characteristics of the golden age, and of the ages of silver, brass, and iron which followed, are described in the first book of Ovid's *Metamorphoses*. The term is used to represent the period of highest development in literature, art, and history. Consult K. F. Smith, "Ages of the World (Greek and Roman)," in Hastings, *Encyclopedia of Religion and Ethics*, vol. iv (New York, 1908). See AGE; SATURN.

**GOLDEN APPLE.** See PARIS.

**GOLDEN ASS** (Lat. *Asinus Aureus*). A fable or romance written by Apuleius, a Latin writer of the second century. The work is entitled *The Metamorphoses, or the Golden Ass*, and was modeled after a similar work by Lucian, which Apuleius paraphrased and embellished with other tales, among which the one best known is that of Cupid and Psyche. The hero is punished for his curiosity by being changed into an ass, but after a series of most wonderful adventures he is purified and resumes his natural form. This story is thought by some to have been written as a satire on priests, magicians, and debauchers. The moral and religious conditions of Apuleius' time are portrayed with much humor and truth. The language, although abounding in clever turns, often contains obsolete and provincial phrases. The *editio princeps* was published in Rome in 1469. The story of *Cupid and Psyche* was first translated in 1566, by Adlington; this translation was republished in 1887 with an introduction by Andrew Lang. For further bibliography, see APULEIUS.

**GOLDEN BEETLE.** The golden beetles (family Chrysomelide, tribe Cassidini) are among the most beautifully colored of all beetles. They are usually small, with a gold or greenish iridescence which in many species fades completely as soon as the insect dies, so that mu-



seum collections give no conception of the beauty of these beetles when alive and on their food plant; but the brilliancy is said to vary with the excitation of the beetle. They are flattened below and convex above, hence they have also been named tortoise beetles. The margins of the prothorax and elytra are expanded so as to form an oval flat frame about the convex part of the beetle. Both the adults and the larvæ of *Cassida*, or *Coptocycla*, *aurichalcea* feed on the morning-glory and sweet potato, and a large yellow and black species feeds on the sunflower. The caudal end of the larva is forked, and to it are retained the molted skin and frass, which are held up over the body like a shield. Pupation takes place on the underside of the leaves of the food plant.

**GOLDEN BELL.** See FORSYTHIA.

**GOLDEN BIBLE.** A name given on its pretended discovery to the Book of Mormon, which was described as being written on sheets of metal resembling gold.

**GOLDEN BOOK.** See LIBRO D'ORO.

**GOLDEN BULL** (Lat. *bullæ aureæ*, so called from the gold case in which the seal attached to the bull was inclosed). The Imperial edict issued by the Emperor Charles IV, in 1356, for the purpose of settling the form of the Imperial election and coronation, the persons to whom the right of election belonged, and their duties and privileges. Up to that time some uncertainty had prevailed as to the rights of the electoral body, claims having frequently been made by several members of the lay electoral families and divisions having repeatedly arisen from this uncertainty; the effect of such divisions being to throw the decision for the most part into the hands of the Pope. In order to obviate these inconveniences, the Golden Bull defines that one member only of each electoral house shall have a vote, viz., the representative of that house in right of primogeniture, and, in case of his being a minor, the eldest of his uncles paternal. The seven electors were declared to be the archbishops of Mainz, Trèves, and Cologne, the King of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. The place of election of the Emperor was fixed at Frankfort; the coronation was to take place at Aix-la-Chapelle. On the great question as to the dependence of the Imperial office on the Pope, and as to the right of the Pope to examine and approve the Imperial election, the Golden Bull is silent, although it declares the Emperor competent to exercise jurisdiction in Germany from the moment of election. It invests the vicariate, together with the government of the Empire during an interregnum, in the Elector Palatine and the Elector of Saxony; but it is to be noted that this applies only to Germany. Of the vicariate of Italy, which was claimed by the popes, nothing is said. The Golden Bull also contains some provisions restraining the so-called *Faustrecht* (lit. 'fist law,' or right of private redress). It was promulgated in a diet at Nuremberg in 1356 and ratified at Metz in the same year, and original copies of it were furnished to each of the electors and to the city of Frankfort. The electoral constitution, as settled by this bull, save for the number of electors, was maintained almost unaltered till the extinction of the Empire. There is a translation into English of the Golden Bull in Henderson, *Historical Documents of the Middle Ages* (London, 1892). In Hungarian history there is

a constitutional edict called by the same name. It was issued by Andrew II in 1222. It strengthened the monarchy, although limiting its functions. It contained guarantees of individual liberty and insured periodical meetings of the assemblies. It preserved the power of the nobles by preventing further subdivisions of fiefs. Consult Hahn, *Ursprung und Bedeutung, der Goldenen Bulle Karls IV* (Breslau, 1902).

**GOLDEN CALF.** The molten image fashioned, according to Ex. xxxii. 2 et seq., at Sinai by Aaron. When requested by the Israelites to make a god for them, he demanded their golden earrings, made of them a molten image, and said (so 2 Hebrew Manuscripts and the Greek), "This is thy god, O Israel, who brought thee up out of the land of Egypt." The Masoretic text, supported by the versions, reads: "These are thy gods"; but the singular is used in Neh. ix. 18, where the words are quoted, and the plural is manifestly a later change intended to suggest the heathenish character of the bull worship. As Aaron says: "There will be a festival to Yahwe to-morrow," there can be no question as to whose image the golden calf was intended to be. It was ground to powder by Moses; the people were obliged to drink it, mixed with water; and 3000 were slain by the Levites to atone for the sin. The narrative points to the existence of the worship of Yahwe under the form of a bull among the Hebrews. For this there is abundant evidence. Images of bulls overlaid with gold stood in the ancient sanctuaries at Dan and Bethel, though this cult is not traced further back than the days of Jeroboam (1 Kings xii. 28 et seq.; 2 Kings x. 29). In Samaria likewise the bull cult was introduced (Hos. viii. 5). In the temple at Jerusalem there were also images of bulls. The brazen sea, representing the primeval ocean, rested on oxen; and in the Holy of Holies gold-covered images of winged bulls (see CHERUB) stood on the lid of the sacred chest. (See ARK OF THE COVENANT) It is difficult to say, however, how far these were regarded as representations of Yahwe. The story of Aaron's making a golden calf may have been told originally to establish the antiquity of the bull cult and its legitimacy as a part of the worship of Yahwe; but in the hands of redactors, who were opposed to all image worship, the story was reshaped so as to make it appear that Aaron in reality committed a grievous sin for which atonement had to be made.

**GOLDEN CHAIN.** See LABURNUM.

**GOLDEN CIRCLE, KNIGHTS OF.** See KNIGHTS OF THE GOLDEN CIRCLE.

**GOLDEN CROSS, UNITED ORDER OF.** A fraternal organization, founded in 1876. It had, in 1913, 11 grand commanderies and 488 subordinate commanderies. Its members numbered about 171,000. The order has disbursed since its organization a total of \$11,650,032. The disbursements for each year average about \$400,000.

**GOLDEN-CROWNED SPARROW.** A large and sprightly sparrow (*Zonotrichia coronata*) of northwestern America, distinguished by a broad stripe of yellow on the crown of the head. It is related to the familiar white-throated and white-crowned sparrows of the Eastern States and like them has a most pleasing song. It breeds along the coast from northern California to Alaska, nesting on the ground, and is widely migratory.

**GOLDEN-CROWNED THRUSH** (so called from the yellow spot on its head), or WAGTAIL

(q.v.). An American wood warbler (*Seiurus aurocapillus*). See OVENBIRD.

**GOLDEN-CROWNED WREN.** See KINGLET.

**GOLDEN EAGLE.** See EAGLE.

**GOLD'EN-EYE'.** A duck of the genus *Clangula*, having the bill shorter than the head and the nostrils well forward; a garrot. The typical species (*Clangula clangula americana*) is a common winter visitant, appearing in small flocks, most frequently in severe weather, not only in estuaries, but on the lakes and rivers of inland parts of North America, as it does on those of all the central and southern parts of Europe, and equally on those of the temperate parts of Asia. The wings are pointed and rather short, with the first quill the longest, and the tail of 16 feathers is rounded and of medium length. In the male the coloration is pied black and white, while it is brown and white in the female. The golden-eye takes its name from the golden-yellow hue of the iris, and the male may be recognized by the metallic green of the head and upper neck, the white patch at the base of the beak below the eye, and by the scapular region being striped with white. The length of the European bird is about 18 inches; the American form (*americana*) is somewhat larger. A second North American species is Barrow's, or the Rocky Mountain golden-eye (*Clangula islandica*), which is larger and has the white loreal spot more extended; it is more northerly and less numerous than the other. Though classed among the sea ducks, and like them subsisting largely on animal food, these ducks are scattered inland all over the continent, and are well known to gunners by sound as well as by sight, for their wings make a loud and characteristic whistling in flight; hence a common local name is "whistler," or "whistlewing." They go in small parties, mix with other ducks, especially bluebills, and are extremely watchful, often alarming their companions and leading the whole flock swiftly away before any other kind has suspected danger. They breed from Quebec and Dakota northward and throughout northern regions generally as far as trees go, making their nests of straw, feathers, etc., in cavities of dead trees and tall stumps, and laying 8 to 10 ashy-green eggs. Consult: Dresser, *Birds of Europe* (London, 1881); Job, *Among the Waterfowl* (New York, 1902); Oakley, *Wild Ducks: How to Rear and Shoot Them* (ib., 1905); Shaw, *Wild Fowl* (ib., 1905).

**GOLDEN-EYED FLY.** A lace-winged fly of the family Chrysopidae, so called because in some lights the eye seems made of burnished gold. See LACEWING.

**GOLDEN FLEECE.** In Greek tradition, the fleece of the ram Chrysomallus, the recovery of which was the object of the Argonautic expedition. (See ARGONAUTS.) The golden fleece has given its name to a celebrated order of knighthood in Austria and Spain, founded by Philip the Good, Duke of Burgundy, and sovereign of the Netherlands, at Bruges, on Jan. 10, 1430, on the occasion of his marriage with Isabella, daughter of King John I of Portugal. This order was instituted for the protection of the Church, and the fleeces was probably assumed for its emblem as much from being the material of the staple manufacture of the Low Countries as from its connection with heroic times. The founder made himself grand master of the order, a dignity appointed to descend to his successors. This order ranks among the highest on the Con-

tinent. The knights were consulted before the sovereign undertook a war, and his deeds were subject to review by all the members of the order. After the death of Charles V the Burgundo-Spanish line of the house of Hapsburg remained in possession of the order; but at the close of the War of the Spanish Succession the Emperor Charles VI laid claim to it in virtue of his possession of the Belgian Netherlands and, taking with him the archives of the order, celebrated its inauguration with great magnificence at Vienna in 1713. Philip V of Spain contested the claim of Charles, and the dispute, several times renewed, was at last tacitly adjusted by the introduction of the order in both countries. In Austria the Emperor may now create any number of knights from the old nobility. In Spain princes, grandees, and personages of peculiar merit are alone eligible; if Protestants, the Pope's consent is required. The insignia are a golden fleece hanging from a gold and blue enameled flint stone emitting flames, and borne in its turn by a steel forming the letter B. On the enameled obverse is the legend *Pretium Laborum Non Vile* (No mean recompense for effort). The decoration was originally suspended from a chain of alternate firestones and rays, for which Charles V allowed a red ribbon to be substituted, and the chain is now worn only by the grand master. The costume consists of a robe of deep-red velvet, lined with white taffeta, and a long mantle of purple velvet lined with white satin and richly trimmed with embroidery, containing firestones and steels emitting flames and sparks. On the hem, which is of white satin, is embroidered in gold *Je l'ay empris* (I have dared it). There is also a cap of purple velvet embroidered in gold, with a hood; the shoes and stockings are red. Consult Paul, "The Order of the Golden Fleece," in *Scottish Historical Review* (Glasgow, 1908). See ORDERS.

**GOLDEN GATE, THE.** See SAN FRANCISCO BAY.

**GOLDEN HORDE.** The name (1) of a great body of Tatars who, under Batu Khan, grandson of Genghis Khan, overran eastern Europe; and (2) of the khanate, or empire, which they established on the banks of the Volga, and which is also known as Kiptchak (q.v.). The army led by Batu (known also as Sain Khan, 'the good prince,' and described by Marco Polo as "a very puissant king") was one of three sent out in 1235 by Ogotai Khan, the successor of Genghis. Crossing the Ural River in 1237, they invaded Russia, penetrating to the very centre of the country, pillaging, burning, devastating, and murdering, defeating army after army, and showing no mercy. Moscow and Kiev and other cities were taken and burned, and their inhabitants put to the sword. From Russia they passed into Poland, Silesia, and Hungary, carrying devastation and bloodshed everywhere. Lublin and Cracow were destroyed in 1240, Breslau was burned in 1241, and at Liegnitz, on the field since known as the Wahlstatt, an army of Silesians, Poles, and Teutonic knights, under Henry II, Duke of Silesia, was overcome, although with great loss to the victors, April 9, 1241. Unsuccessful in the siege of Neustadt, the Horde turned eastward, and Batu pitched his gorgeously embroidered silk tent (which gave rise to the name "Golden") on the banks of the Volga, and summoned the Russian princes to his presence to do him homage. This settle-

ment was called *Sir Orda* (Golden Camp), from which originated the expression "Golden Horde." The empire established by him over the Russians was maintained until the power of the khans was broken by Ivan III towards the close of the fifteenth century. Consult: Lane-Poole, *Mohammedan Dynasties* (London, 1893); Howorth, *History of the Mongols* (ib., 1876-85); Schurtz, "Hochasien," in vol. ii of Helmholtz, *Weltgeschichte* (Leipzig, 1902). See KIPCHAK; MONGOL DYNASTIES.

**GOLDEN HORN.** See CONSTANTINOPLE.

**GOLDEN HOUSE OF NERO** (Lat. *Aurea Domus*). A remarkable structure planned by Nero after the fire of 64 A.D., between the Palatine and the Esquiline hills, covering an area of a square mile. It embraced farms, vineyards, game preserves, sulphur and sea baths, ponds and waterfalls, and elaborate colonnades and halls, adorned with the most lavish expenditure. Among its celebrated features were a vestibule containing a colossal bronze statue of Nero, 120 feet in height; a portico 3000 feet long; and a banquet hall with a revolving ceiling of carved ivory representing the firmament. In other halls the ceilings dropped flowers and perfumes on the guests. The walls were incrustured with rare marbles, mosaics, mother-of-pearl, precious stones, and paintings, and the courts and apartments contained hundreds of rare columns and statues. The depression where the Coliseum now stands was occupied by a lake. The Golden House had been pulled down before 75 A.D., and its remains were used as foundations for later buildings, particularly for the baths of Trajan and Titus, while the grounds were given back to public use. Within the extensive remains of the Golden House excavations have again been made recently, by Wege; consult his article, "Das Goldene Haus des Nero," in *Jahrbuch des Kaiserlich Deutschen Archäologischen Instituts*, xxviii, 127-224 (Berlin, 1913), summarized by Winter, in *The Classical Weekly*, vii, 163-164 (New York, 1914).

**GOLDEN HUMMER.** A Peruvian humming bird (*Heliothyrus aurita*), having a golden gloss upon its plumage. Also called black-eared fairy. See Colored Plate of HUMMING BIRDS.

**GOLDEN LEGEND** (Lat. *Legenda Aurea*). A celebrated collection of hagiology, which for a time enjoyed almost unexampled popularity, having passed through more than 100 editions, and translations into almost all the European languages. It is the work of James of Viraggio, better known as Jacobus de Voragine, who was born at Viraggio (now Varazze), on the coast, near Genoa, about the year 1230. He entered the Dominican Order (1244) and was provincial of the order in Lombardy from 1267 to 1286. In 1292 he became Archbishop of Genoa, and by his ability, moderation, and exemplary life he played a most influential part in the public affairs of his time. He died in Genoa in 1298. The *Legenda* consists of 177 sections, each of which is devoted to a particular saint or festival, selected according to the order of the calendar. It presents nearly the entire narrative portions of the Bible, with many homilies and much information, some curious, concerning Church characters. In its execution the work, as may be supposed from its age, is far from critical. It was primarily a book of devotion, and is deserving of study as a literary monument of the period and as illustrating the religious habits and views of the Christians at

that time. The work, entitled *Legenda Sanctorum* by its author, is also called *Historia Longobardica*, because it appends a brief Lombard chronicle to the life of Pope Pelagius. A translation of the *Golden Legend* was made by William Caxton for the Earl of Arundel and first published in London (1483); it was reprinted, edited, and modernized by Ellis (London, 1900). The classical edition of the original Latin is by Græsser (Breslau, 1890).

**GOLDEN LEGEND, THE.** A religious dramatic poem by Longfellow, published in 1851. With *New England Tragedies* and *The Divine Tragedy*, it forms a trilogy entitled *Christus*. It is a mediæval tale, faintly resembling *Faust*.

**GOLDEN (or CAPE) MOLE.** A member of a family of insectivores, Chrysochloridæ, confined to South Africa, having an external resemblance to, and the habits of, moles, but in structure more closely allied to the tenrecs and potamogales. They do not dig, as do the true moles, with forefeet modified into hands, but mainly with the enormous claws of the two middle fingers. They take their name from the brilliant and varying bronzed lustre of their fur.

**GOLDEN NUMBER** (Lat. *numerus aureus*). The number of any year in the Metonic cycle (q.v.). As this cycle embraces 19 years, the golden numbers range from 1 to 19. The cycle of Meton came into general use soon after its discovery, and the number of each year in the Metonic cycle was ordered to be engraved in letters of gold on pillars of marble. Since the introduction of the Gregorian calendar the point from which the golden numbers are reckoned is 1 B.C., as in that year the new moon fell on January 1; and as by Meton's law the new moon falls on the same day (January 1) every nineteenth year from that time, we obtain the following rule for finding the golden number for any particular year: "Add one to the number of years, and divide by nineteen; the quotient gives the number of cycles, and the remainder gives the golden number for that year; and if there be no remainder, then nineteen is the golden number, and that year is the last of the cycle." The golden number is used for determining the epact (q.v.) and the time for holding Easter (q.v.).

**GOLDEN ORIOLE.** Yellow being the characteristic color of orioles (as implied in the name), the adjective "golden" has been locally applied to many forms—as, e.g., to the American hangnests. Strictly it belongs only to the European true oriole (*Oriolus oriolus*). See ORIOLE.

**GOLDEN PLOVER.** See PLOVER.

**GOLDEN RAIN.** See FORSYTHIA.

**GOLDENROD** (*Solidago*). A genus of plants of the family Compositæ, closely allied to *Aster*. The species are natives chiefly of temperate climates and are most numerous in North America. A few are European; only one is British, the common goldenrod (*Solidago virgaurea*), a perennial plant of very variable size. At least 75 species are found in the United States, and because of its abundance, wide distribution, and showiness, many botanists and flower lovers claim for the goldenrod the distinction of being called the national flower. *Solidago bicolor* has cream-colored or nearly white flowers. *Solidago odora* (sweet goldenrod) yields an aniseate odor when its leaves, which have even been used as a substitute for tea, are crushed. It contains a volatile oil which

has been used in medicine as an aromatic, diaphoretic, and tonic. Blue-stemmed goldenrod (*Solidago caesia*), and the varieties of *Solidago virgaurea*, *serotina*, *memoralis*, and *racemosa*, are among the most interesting. Sheep readily eat various species of goldenrod, and as a forage it is considered valuable in parts of New York and elsewhere. When prepared in the same manner as hemp, the stalks of *Solidago canadensis*, which attain a height of 4 to 6 feet, are said to yield a strong fibre that might be utilized.

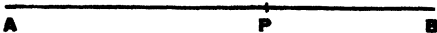
**GOLDEN ROSE** (Lat. *rosa aurea*). A rose formed of wrought gold and blessed with much solemnity by the Pope in person on the fourth Sunday of Lent, which is called, from the first word of the introit for the day, Latere Sunday. The prayer of blessing contains a mystic allusion to Christ as "the flower of the field and the lily of the valley." The rose is anointed with balsam, fumigated with incense, sprinkled with musk, and is then left upon the altar until the conclusion of the mass. It is then usually presented to some Catholic prince or princess whom the Pope desires especially to honor, with an appropriate form of words. The origin of the ceremony is uncertain, but the most probable opinion as to its date is that of Martène and Du Cange, who fix it in the pontificate of Innocent IV (1243-54). Consult Barry, *The Sacramentals* (Cincinnati, 1858). See LATARE MEDAL.

**GOLDEN RULE**, REGULA AUREA, RULE OF THREE, REGULA DE TRIBUS, MERCHANTS' RULE, and REGULA MERCATORUM. Terms once applied in arithmetic to designate the operation of simple proportion. See PROPORTION.

**GOLDEN SEAL**. See HYDRASTIS.

**GOLDEN SEAL**, ORDER OF THE. A fraternal insurance organization, incorporated under the laws of New York State in 1902. It is governed by a supreme court. Membership carries with it insurance against accident, sickness, and death. Every six years a distribution of the profits is made, and members receive a cash dividend. In 1914 there were about 500 local courts, with about 15,000 certificates of membership in good standing. The annual benefits distributed amount to about \$1,000,000.

**GOLDEN SECTION**. A popular term for the division of a line segment in extreme and mean ratio. Given the line segment AB, if the



point P is found such that  $AB : AP = AP : PB$ , or  $AB \times PB = AP^2$ , P is said to divide AB in golden section. The ratio of AP to PB is about 8 : 5. The theory of the golden section was known to the Pythagoreans and was used by them in the construction of the regular pentagon. Eudoxus (q.v.) discovered several theorems relating to it, some of these being in the nature of algebraic identities, as, e.g., that  $(AP + \frac{1}{2} AB)^2 = 5 (\frac{1}{2} AB)^2$ . The first extensive treatment of the subject in modern times is that of Fra Luca Pacioli, whose work, *Divina proportione*, appeared in Venice in 1509; reprinted, with German translation, in the *Quellenschriften für Kunstgeschichte und Kunsttechnik des Mittelalters und der Neuzeit* (Vienna, 1889). The mediæval name, *Divina proportio*, has given place in modern times to *Sectio aurea*, or golden section. The ideas of Pacioli have recently been revived by Zeising, *Neue Lehre von den Proportionen des menschlichen Körpers* (Leipzig, 1854); id., *Der goldene*

*Schnitt* (ib., 1884), who has claimed the golden section as the æsthetic law in nature (see ÆSTHETICS), and by Bochenek, *Kanon aller menschlichen Gestalten und der Tiere* (Berlin, 1885), who has applied it in matters of art. Consult also: Wittstein, *Der goldene Schnitt und die Anwendungen desselben in der Kunst* (Hanover, 1874); Pfeifer, *Der goldene Schnitt* (Augsburg, 1885); Matthias, *Die Regel von goldenen Schnitt im Kunstgewerbe* (Leipzig, 1886).

**GOLDEN SPUR**. A papal order, founded probably by Paul IV, but also attributed to Constantine and to Pope Sylvester II. The decoration was so freely bestowed that the value was impaired, and the order was reconstituted in 1841. It is now conferred for special distinction and for services to the Catholic church.

**GOLDEN STATE**. California. See STATES, POPULAR NAMES OF.

**GOLDEN TERGE**, THE, or THE GOLDYNN TARGE. An allegorical poem by William Dunbar, published in 1508 by Chepman and Myllar.

**GOLDEN VERSES** (Gk. *ἐπη χρυσά*, *epē chrysa*). A traditional collection of gnomic sayings of the Pythagoreans, containing the teachings of virtue in practical form.

**GOLDEN WARBLER**. The commonest of American wood warblers (*Dendroica æstiva*), more frequently called summer warbler, yellow warbler, or summer yellowbird. (See WARBLER.) The golden-winged warbler is a different but closely allied species (*Vermivora chrysopetra*), one of the swamp warblers (q.v.).

**GOLDEN WEDDING**. See WEDDING ANNIVERSARIES.

**GOLDEN-WINGED WOODPECKER**. See FLICKER.

**GOLDFINCH**. 1. A pretty European finch (*Carduelis carduelis*), belonging to the Fringillidae family. It is a favorite cage bird, on account of its soft and pleasing song, its intelligence, its liveliness, and the attachment which it forms for those who feed and caress it. The goldfinch is about 5 inches in entire length; black, blood red, yellow, and white are beautifully mingled in its plumage. The colors of the female are duller than those of the male. It is widely diffused throughout Europe and some parts of Asia and is to be seen in small flocks on open grounds, feeding on the seeds of thistles and other plants or in gardens and orchards. Its nest is made in a tree, bush, or hedge, is remarkable for its extreme neatness, and is always lined with the finest downy material that can be procured. The eggs are four or five in number, bluish white, with a few spots and lines of pale purple and brown. The goldfinch is much employed by birdcatchers as a call bird. It can be trained to the performance of many little tricks, such as the raising of water for itself from a well in a bucket the size of a thimble. It has been introduced into America and is now fairly well established in the vicinity of New York City and to a less degree about Boston. See PLATE OF CAGE BIRDS.

2. The American goldfinch (*Astragalinus tristis*), more generally called "yellowbird" and "thistle bird," is very similar to the European species in habits and song and displays the same interesting liveliness and affection in domestication. The nest is also of the same elegant structure. It is a common bird in most parts of North America. It is hardly 5 inches in length

GOLDENROD ETC.



1. ROUGH-LEAVED GOLDENROD (*Solidago patula*).  
2. "EVERLASTING" (*Anaphalis margaritacea*).

3. BUSHY GOLDENROD (*Solidago lanceolata*).  
4. WHITE SNAKEROOT (*Eupatorium ageratifolium*).  
5. BLUE-STEMMED GOLDENROD (*Solidago caesia*).



and is bright yellow, with the crown, wings, and tail black. The female is much duller, grayish brown, more or less tinged with yellow beneath. In winter the male assumes a plumage very similar to that of the female. The goldfinch is eminently gregarious, except during the breeding season, and it seems loath to give up its social life, for it is the last of our birds to go to house-keeping; the eggs, which are spotless, are rarely laid before the end of June. The nest is a delicate cup of soft materials, sometimes wholly of vegetable down, and is placed in a bush or low tree. It is often invaded by the cowbird (q.v.), in which case the goldfinches are likely to construct a second story—i.e., a new nest on the top of the original one—burying their own and the strange egg and laying a fresh set above. The flight of the goldfinch renders the bird easy to recognize on the wing, for it is always in a series of undulations, and generally is accompanied by a faint sweet twitter, which one writer translated as "per-chick'-o-pee." Several closely related species are found in the southwestern United States and in Mexico.

**GOLDFINNY.** See GOLDSINNY.

**GOLD'FISH',** or GOLDEN CARP. A fish (*Carassius auratus*) closely related to the carp, a native of China, but now domesticated and naturalized in many parts of the world. It has been long common in many of the fresh waters of China and was introduced into England about the end of the seventeenth or the beginning of the eighteenth century. On account of the brilliancy of its colors and the ease with which it is kept in glass globes or other vessels in apartments, it soon became, and has continued to be, a general favorite. Its ordinary length is 5 or 6 inches, but it has been known to reach a foot. When young, it is of a blackish color, but acquires its characteristic golden red as it advances to maturity, some individuals (*silver-fish*) becoming rather of a silvery hue. Monstrosities of various kinds are frequent, particularly in the fins and eyes, a favorite Japanese variety having three large tails. Culturists can induce and strengthen the artificial golden color by controlling the amount of mineral in the water. Goldfish are easily kept in small glass aquaria. There should be some sort of water plant in the water, which should not be cold, and should be changed in part every few days. Occasional sunlight is good, to prevent the growth of fungi. The safest food is that prepared and sold for the purpose. Escaped specimens naturalized in rivers (as in the Potomac) revert to their native olivaceous green hue. For an elaborate account of these fish, consult Wolf, *Goldfish Breeds* (Philadelphia, 1908). An artificial grotesque variety is illustrated on the Plate of CARP AND ALLIES.

**GOLDFUSS,** gölt'föös', GEORG AUGUST (1782-1848). A German paleontologist and zoologist. He was born at Thurnau, near Bayreuth, Bavaria, was educated at Berlin, and in 1804 received the degree of Ph.D. at Göttingen, where he became professor of zoölogy in 1818. During the last 30 years of his life he was professor of mineralogy and zoölogy at Bonn, where he was also appointed director of the Zoölogical Museum. Besides his principal work, *Petrifacta Germaniæ* (partly in collaboration with Count zu Münster, 1826-44), he published *Grundriss der Zoologie* (2d ed., 1834). He is said to have been the first to introduce the term "protozoa" into scientific nomenclature.

**GOLD'IE,** SIR GEORGE DASHWOOD TAUBMAN (1846- ). A British administrator, the founder of Nigeria, born at the Nunnery, Isle of Man. After graduating from the Royal Military Academy at Woolwich he was lieutenant in the Royal Engineers for two years. He visited the Niger in 1877 and became interested in adding this territory to the British Empire. To this end he organized (1879) the British commercial interest of those regions into the United African Company, modeled on the defunct East India Company. The name was changed to the National African Company; its capitalization was raised from £125,000 to £1,000,000; new stations were opened; French interests were purchased; and in 1886 a charter was granted by the British government to the company under the new name of the Royal Niger Company, with Goldie as Vice Governor. In 1895 he became Governor. In spite of the activities of French and German political agents, Goldie built up the state and maintained the integrity of the territory, but finally, in 1900, the Royal Niger Company sold its territory to the British government for £865,000. Goldie was a royal commissioner on the South African War in 1902-03 and on war stores in 1905-06. He was created a K. C. M. G. in 1887, was chosen president of the Royal Geographical Society in 1905, and became a fellow of the Royal Society, a privy councillor (1898), and an alderman of the London County Council (1908).

**GOLD'ING,** ARTHUR (c.1556-c.1605). An English writer and translator. He was born probably in London and is said to have studied at Queen's College, Oxford. He was a friend of Sir Philip Sidney, who, on leaving for the Low Countries, intrusted to him the completion of the translation of Philippe de Mornay's treatise, *De la vérité de la religion chrétienne*, which Golding published under the title *A Worke Concerning the Truethenesse of the Christian Religion* (1589). He made many translations, devoting himself especially to those from the works of Calvin and Theodore Beza, but will be remembered chiefly for his rendering into English, in ballad metre, of the "fyrst fower bookes" of Ovid's *Metamorphoses* (1565-67).

**GOLD LACE.** A fabric formed by weaving silken threads that have been previously gilded. The peculiarity of this manufacture consists in the gilding of the silk in such a manner that it shall retain sufficient flexibility for weaving. A deep yellow or orange-colored silk is used for the purpose. The usual method of doing this is by what is called "fibre plating." A rod of silver is gilded by simply pressing and burnishing leaves of gold upon it. This gilded silver is then drawn into very fine wire, so fine that one ounce of metal can be extended to the length of more than a mile. It is then flattened between polished steel rollers, and further extended, so that a mile and a quarter weighs only one ounce; for the last drawing the wire is passed through perforated gems, such as diamonds or rubies. The film of gold upon this flattened wire is much thinner than beaten gold leaf and has frequently been quoted as an example of the divisibility of matter, as one inch of the highly gilded wire contains but the eighty-millionth part of an ounce of gold, while  $\frac{1}{10}$  of an inch, which is a visible quantity exhibiting the color and lustre of gold, contains but  $\frac{1}{1000000}$  of an ounce; or, in other words, one ounce of gold covers a length of wire of

more than 100 miles. This flattened gilded wire is then wound over the silk, so as to inclose it completely and produce an apparently golden thread. Other means of directly gilding the thread have been tried and for some purposes are successful; but none have yet been discovered which give the thread the same degree of lustre as the above, which was first practiced in a ruder manner by the Hindus. Much of the so-called gold lace of commerce is made of an alloy known as Dutch metal. SILVER LACE is made in the same manner as gold lace, except that the gold coating is omitted. Both gold and silver lace are used extensively for military and other uniforms and for ornamental effects in women's apparel.

**GOLD LEAF.** See GOLDBEATING.

**GOLDMAN**, gölt'män, EMMA (1869- ). An American anarchist, born in Kovno Province, Russia. She lived in Königsberg, Prussia, in 1878-82, went to St. Petersburg, and in 1886 emigrated to the United States. The execution of certain participants in the Haymarket Square Riot (q.v.) in Chicago in that year aroused her sympathies and finally led her to support anarchism. After 1889 she was associated in New York with Johann G. Most, Alexander Berkman, and other agitators, among whom her fiery speeches in German and Yiddish soon made her popular. In 1893 she was sentenced to one year at Blackwell's Island (New York) for inciting to riot. She lectured in England and Scotland in 1895 and 1899 and made extended lecture tours in the United States in 1897, 1899, and 1907-10. Following the assassination of William McKinley in 1901, she lived under the name of "Miss Smith" to escape persecution. After 1906 she coöperated in the publication of *Mother Earth*, a monthly anarchist magazine. She had attended the First Anarchist Congress at Paris, in 1899, and in 1907 was a delegate to the Second Congress at Amsterdam. Her writings include *Anarchism and Other Essays*, with a biographical sketch by Hippolyte Havel (1910), and *The Social Significance of the Modern Drama* (1914).

**GOLDMARK**, gölt'märk', KARL (1830-1915). An Austrian composer. He was born in Keszthely, Hungary, and musically was largely self-taught, although he had some instruction on the violin from Jansa in Vienna in 1844 and three years later took lessons in composition from Böhm. Firmly believing in his musical talent, he devoted himself almost entirely to composition. Overcoming the most difficult obstacles, he so far succeeded as to give his first public concert in Vienna at the age of 26 years, a pianoforte concerto of his own being a feature of the programme. Outside of Germany he is better known through his orchestral suites and arrangements and small instrumental and vocal compositions than for his operas, although in his own country, as well as in Germany, they are regarded as standard. His published works include: operas—*Die Königin von Saba*, his chief operatic success; *Merlin* (1886); *Das Heimchen am Herd* (1896, from Dickens's *Criquet on the Hearth*); *Die Kriegsgefangene* (1899); *Gott von Berlichingen* (1902); *A Winter's Tale* (1906). The overtures to *Prometheus Bound*, *Sappho*, *Sakuntala*, *Penthesilea*, *Im Frühling*, and *In Italien* are universal favorites. Other compositions are: *Sturm und Drang* (for pianoforte, op. 5); symphonies—*Ländliche Hochzeit*, and one in E flat; scherzo in A (for orchestra);

a symphonic poem *Zriny*; two violin concertos; chamber music; songs; choruses.

**GOLDMARK**, RUBIN (1872- ). An American composer, born in New York. From 1889 to 1891 he studied piano and composition at the Vienna Conservatory, and after his return to America continued the piano with Joseffy and composition with Dvořák. For six years he was director of the Colorado College of Music (1895-1901). In 1902 he returned to New York, devoting his time to composition and lecture recitals. His compositions include *Theme and Variations*, for orchestra, a concert overture *Hiawatha*, a symphonic poem *Samson*; some excellent chamber music, piano pieces, and songs.

**GOLD OF PLEASURE**, or FALSE FLAX (*Camelina*). A genus of plants of the family Cruciferae. The common gold of pleasure (*Camelina sativa*) (Fr. *Cameline*, Ger. *Dotter*) is an annual 1½ to 3 feet high, with smooth, bright-green, entire or slightly toothed leaves, and terminal racemes of yellow flowers and pear-shaped pods. Notwithstanding its high-sounding English name, the plant is of humble and homely appearance. It grows in fields and waste places of Europe and the north of Asia, but is not regarded as a native of America, although often found in fields, particularly of flax. Its seed is very commonly mixed with flaxseed imported from other lands. In many parts of Germany, Belgium, and the south of Europe it is extensively cultivated for the sake of its seeds, which are rich in oil, and the oil cake of which, as well as the seeds, though inferior to linseed and linseed-oil cake, is also used for feeding cattle. The oil, although sweet and pure at first, soon becomes rancid and is less valued than that of rapeseed or colza, with which it is often mixed. The value of the plant in agriculture depends much on its adaptation to poor sandy soils, although it prefers those of a better quality; and, on account of its rapid growth, to secondary cropping and green manuring. Since it readily scatters seed, it is likely to become a weed pest. The stems, which are tough, fibrous, and durable, are used for thatching and making brooms; their fibre is adapted for making coarse paper. See CAMELINA.

**GOLDONI**, göl-dó'né, CARLO (1707-93). The most celebrated Italian writer of comedy. He was born in Venice, Feb. 25, 1707, of a good family, which lost its property in his childhood. His father, a physician, took him to Perugia, where he first entered school. He was encouraged by his father in his strong taste for the literature of classic comedy and was given an opportunity for practice on the amateur stage. But the boy showed no aptitude for such performances and was sent to Pavia to study for the Church. Still less fitted, however, for being an ecclesiastic than for being an actor, he was finally expelled from college for writing scurrilous satires. He studied law and was admitted as an advocate, getting his degree from Padua in 1732, after his father's death. But the legal profession did not prove lucrative, and he relinquished its practice to set about composing comic almanacs, which became highly popular. In this early part of his career he wrote a few tragedies, among them *Belisario*, and several of his minor comedies were represented, attracting public favor by their novelty as well as their merits. In 1736 he married the daughter of a notary of Genoa, and about 1740 was for a short time Consul of Genoa at Venice.



Financial difficulties, however, occasionally hampered him in literary work, until, having obtained an introduction to Prince Lobkowitz, he was intrusted with the composition of an ode in honor of Maria Theresa, and with the organization of the theatrical entertainments of the Austrian army. Subsequently for a time he lived at Florence and Pisa. He returned to Venice in 1747 to write for a manager named Medebac, and five years later he made still more lucrative arrangements at the theatre of St. Luke, where much of his best work was done. In 1761 he was invited to France, where he was soon appointed Italian master to the royal children—a situation which allowed him to devote himself tranquilly to his literary occupations. He began after a time to write in French, and *Le bourru bienfaisant*, composed for the wedding of Louis XVI, excited the admiration even of Voltaire. On the breaking out of the Revolution Goldoni lost his pension, but after his death (Feb. 6, 1793) it was restored to his widow. He left about 150 comedies of very unequal merit, some of the most noted of which are: *La donna di garbo*; *La bottega del caffè*; *Pamela nubile*; *I Rusteghi*; *Toderò Brontalon*; *La casa nova*; *La locandiera*; *Il giocatore*; *Il vecchio bizzarro*; and *L'Adulatore*. His ambition was to dispense with some of the conventional accessories of the comic stage of his time and elevate that branch of the national drama from the buffooneries into which it had fallen. In this he succeeded. He was a great admirer of Molière, and the larger part of his works are inimitable representations of the events of daily life, under both their simplest and their most complex aspects.

Consult: the *Memoirs of Carlo Goldoni*, trans. by John Black, with an essay by Howells (Boston, 1877); Gherardini, *Vita di Carlo Goldoni*, prefixed to the collected comedies (Milan, 1821); Molmenti, *Carlo Goldoni* (Venice, 1875); Galanti, *Goldoni e Venezia, nel secolo XVIII* (Padua, 1883); Rahany, *Carlo Goldoni: Le théâtre et la vie en Italie au XVIIIème siècle* (Paris, 1896); Copping, *Alfieri and Goldoni: Their Lives and Adventures* (London, 1857); *Lettere di Carlo Goldoni, con prefazione e note di G. M. Urbani* (Venice, 1880); Dole, "Goldoni and Italian Comedy," in *The Teacher of Dante* (New York, 1908); Mathar, *Carlo Goldoni auf dem deutschen Theater des XVIII Jahrhunderts* (Montjoie, 1910); Chatfield-Taylor, *Goldoni: A Biography* (New York, 1913). The most complete edition of his plays is that of Venice, 1788, republished in Florence in 1827.

**GOLDS**, göldz. A people living on the Lower Amur, in southeastern Siberia, belonging physically and linguistically to the Tungusic group of Siberian peoples. Deniker (1900) describes them as "of a very pure type, and having a fairly well developed ornamental art." Laufer, who visited them in 1898-99, notes the great influence of Chinese symbolism and ornamental motifs upon the art products of the Golds; the dragon and the cock seem to have been introduced thus. The Golds have a rich mythology (with many archaic words and phrases), a considerable portion of which has evidently originated in Mongolian Central Asia. From the Chinese some of the Golds have learned the art of silk embroidery, in which they display great skill. Although fishers and hunters generally, a portion of them have taken to agriculture with not a little success. They are said to be losing of

late years their individuality through the mania for Russian fashions, etc. Laufer informs us that "a tendency to rationalism, due perhaps to continuous contact with Chinese culture, is one of the distinguishing traits of the Gold's character." It is to this "preponderance of intellect" that Laufer attributes the absence of many ceremonies, feasts, etc., among the Golds, and the dying out of belief in the old shamans, whose place the Russian physician now takes. Marriages of Golds and Chinese are said to be often infertile. A primitive people, under the influence of such differing cultures as the Chinese and the Russian, the Golds are of considerable ethnological importance. The best recent account of the Golds and other tribes of the Amur will be found in Schrenck, "Die Völker des Amurlandes," vol. iii of his *Forschungen in Amurland, 1854-56* (St. Petersburg, 1881-91), and Laufer, "The Amoor Tribes," in the *American Anthropologist* (New York) for 1900.

**GOLDSBORO**. A city and the county seat of Wayne Co., N. C., 50 miles by rail southeast of Raleigh, on the Southern, the Atlantic Coast Line, and the Norfolk Southern systems, and on the Neuse River (Map: North Carolina, E 2). It has Hermann Park, an Odd Fellows' Orphan Home, the Eastern Insane Asylum (colored), the Goldsboro Hospital, and the Spicer Sanitarium. The city is the commercial centre for an agricultural and cotton-growing region. Its industrial plants include cotton, oil, lumber, and rice mills, furniture factories, agricultural-implement works, venter plants, brickworks, a tobacco stemmery, knitting mills, machine shops, and tobacco warehouses. Goldsboro was settled in 1838 and was incorporated three years later. Under a charter of 1901 the government is vested in a mayor, elected every two years, and a council. The water works are owned and operated by the municipality. Pop., 1900, 5877; 1910, 6107; 1914 (U. S. est.), 10,500.

**GOLDSBOROUGH**, LOUIS MALESHERBES (1805-77). An American naval officer, born in Washington, D. C. He was appointed a midshipman in the navy in 1812, when only seven years old, but did not enter upon active duty until 1816. He served on the Mediterranean and Pacific stations and was promoted a lieutenant in 1825. He then spent two years in study in Paris on leave of absence. In the following year (1827), being again on duty in the Mediterranean, he distinguished himself by rescuing an English brig which had been captured by pirates in the Grecian archipelago. In 1833 he retired from the navy and settled in Florida, where he recruited and commanded a company of volunteer cavalry during the Seminole War. Returning again to the navy, he was promoted commander in 1841 and served in the Mexican War, acting as executive officer of the frigate *Ohio* at the bombardment of Vera Cruz. In 1849 he was a member of the joint army and navy commission in California and Oregon; was superintendent of the United States Naval Academy at Annapolis from 1853 to 1857, during which period (1855) he attained the grade of captain; and from 1857 to 1861 was again at sea. He was made flag officer at the outbreak of the Civil War, and on the abolition of that rank in 1862 became rear admiral. His first service was with the North Atlantic blockading squadron in September, 1861. He commanded the fleet which cooperated with General Burnside in his North Carolina expedition

in 1862, commanded the European squadron in 1865-67, and subsequently was commandant of the navy yards at Mare Island, California, and at Washington. In 1873 he retired from active duty as senior officer in point of length of service.

**GOLDSCHMID**, gölt'shmít. See **FABRICIUS**, **GEORG**.

**GOLDSCHMIDT**, gölt'shmít, **ADALBERT VON** (1848-1906). A German composer. He was born at Vienna and was educated at the conservatory in that city. Although not a musician by profession, he acquired an excellent reputation as a composer, notably through his three-part cantata *Die sieben Todsünden*, based upon the celebrated poem by Robert Hamerling. The cantata was first performed at Berlin in 1875. In 1884 Goldschmidt brought out an opera entitled *Helianthus*, which was followed, in 1889, by a trilogy, *Gwa*.

**GOLDSCHMIDT**, **HANS** (1861- ). A German industrial chemist. He was born in Berlin, was educated in the sciences at Berlin, Strassburg, Heidelberg, and Charlottenburg; and then spent several years in travel. In 1886 he entered into partnership in the chemical manufactory established by his father, and together with his brother Karl he built up an important industry. He is chiefly known, however, for the "Goldschmidt process." See **ALUMINO-THERMICS**.

**GOLDSCHMIDT**, **JENNY LIND**. See **LIND**, **JENNY**.

**GOLDSCHMIDT**, MEIR **AARON** (1819-87). A Danish publicist and novelist, born at Vordingborg, of Jewish parents. He began journalistic work at an early age with the *Næstved Ugeblad*, which became later the much-feared *Corsæren* (1840-46). In 1847 he founded the periodical *Nord og Syd*, which under his management became an influential political organ. In 1861 he established the weekly paper *Hjemme og Ude*. He was a gifted story-teller, and his descriptions of Jewish life have never been surpassed. His numerous novels, tales, and dramas include: *En Jøde* (1845; 3d ed., 1899; Eng. trans. under the title *The Jew of Denmark*, by Mrs. Bushby, 1852); *Hjemlos* (5 vols., 1853-57; Eng. trans. by the author under the title *Homeless*; or, *A Poet's Inner Life*, 1861); *Rabbin og Ruderer* (1869), a drama; *Kjærlighedshistorier fra mange Lande*, a series of love tales of various lands (1867); *Avromche Nattergal* (1873). In *Ravnen* (1867; 3d ed., 1899) and *Maser* he is at his best. A selected edition of his works was published in 1898 et seq. His autobiography, *Livserindringer*, appeared in 1877 in two volumes. Consult G. Brandes, *Levned* (1908).

**GOLDSCHMIDT**, **OTTO** (1829-1907). A German-English pianist, conductor, and composer. He was born at Hamburg and was a pupil of Jakob Schmitt, Mendelssohn, and Chopin. In 1851 he accompanied Jenny Lind on her American tour and married her at Boston in the following year. After a sojourn of three years at Dresden (1852-55), the couple removed to London in 1858, after which Goldschmidt was prominently identified with the musical life of the British capital. He successively became professor and vice principal of the Royal Academy of Music (1863), and director of the Bach Choir (1876-86), a society founded by him in 1875. He also on several occasions conducted the celebrated Lower Rhine Festivals at Düsseldorf. Among his principal musical publications are: *Ruth*, an oratorio (1867); *Choral-Book for*

*England* (with Julius Benedict); a pianoforte concerto, op. 10; a pianoforte trio, op. 12; and several other pianoforte compositions and songs.

**GOLDSCHMIDT PROCESS**. See **ALUMINO-THERMICS**.

**GOLD SEED**. See **DOG'S-TAIL GRASS**.

**GOLD/SINNY**, or **GOLD/FINNY**. A small, bright-yellow European wrasse (*Symphodus melops*), frequenting rocky coasts and sometimes taken by anglers.

**GOLD/SMID**, **SIR FREDERICK JOHN** (1818-1908). A British soldier, explorer, and Orientalist. He was educated at King's College, London, in 1839, entered the army of the East India Company, and served in the China War in 1840-41 and in the Crimea with the Turkish army in 1855-56. He retired in 1875 with the rank of major general. Goldsmid became known more especially for his services in establishing the Indo-European telegraph, of which he was director general from 1865 to 1870. Having obtained telegraph treaties, he superintended the construction of the lines across Persia and Baluchistan to India. In 1870-72 he adjusted boundary claims between Persia and Baluchistan and between Persia and Afghanistan. He was controller of the crownlands of Daira Sanich in Egypt in 1881-82, conducted a diplomatic mission for the British government to Constantinople in 1882, and in 1883 was administrator in the Congo for King Leopold II of Belgium. Versed in Hindustani, Persian, Arabic, and Turkish, Goldsmid was considered an authority on Oriental questions. He published *Telegraph and Travel* (1874), *Eastern Persia* (2 vols., 1876), and the *Life of Sir James Outram* (2 vols., 1880; 2d ed., 1881).

**GOLDSMID**, **SIR ISAAC LYON** (1778-1859). An English Jewish financier and philanthropist, born in London. He was bullion broker of the Bank of England and of the East India Company. University College, London, owes much to him; from 1839 to 1857 he was treasurer of the University College or North London Hospital, which he helped to found in 1834. He was zealous in the cause of Jewish emancipation—the ultimate passage of the Jewish Disabilities Bill, first introduced in 1830, was greatly due to his energy. In 1841 he was created Baronet, the first Jew to win that distinction in England. For settling the monetary dispute between Portugal and Brazil the Portuguese government made him Baron da Palmeira in 1846.

**GOLD/SMITH**, **LEWIS** (c.1763-1846). An English journalist, whose parents or grandparents were Jews from Portugal. He was born in London and was educated there for the law. A strong sympathizer with the Revolutionists in France and Poland, he published, in 1801, *The Crimes of Cabinets, or a Review of the Plans and Aggressions for the Annihilation of the Liberties of France and the Dismemberment of her Territories*, and the following year removed to Paris, where, with the assistance of Talleyrand, he established a triweekly paper, the *Argus*, in the interests of Napoleon. But Napoleon having demanded of him services of espionage and intrigue that he refused to render, he returned to London in 1809 and two years later founded the *Anti-Gallican Monitor*, in which he vehemently pleaded for drastic measures to effect Napoleon's overthrow. He also published: *A Secret History of the Cabinet of Bonaparte* (1810); *Secret History of Bonaparte's Diplomacy* (1812); and *An Exposition of the Con-*

*duot of France towards America* (1810). He became a disciple of Robert Owen, again removed to Paris in 1825, and died there Jan. 6, 1846. In 1832 he published *Statistics of France*.

**GOLDSMITH, OLIVER** (1728-74). An Irish author. He was born, according to long-accepted belief, at Pallas, County Longford, Ireland, or, as now seems more probable, at Elphin, County Roscommon, Nov. 10, 1728. His father, Rev. Charles Goldsmith, was a clergyman of the Established church. When six years old, Oliver was placed in the village school kept by an old soldier, Thomas Byrne, described in "The Deserted Village." On leaving Byrne's school, he suffered permanent disfigurement from a bad attack of smallpox. He subsequently attended other small schools and at length entered Trinity College, Dublin, as a "sizar," or poor scholar (June 11, 1744). Neither at school nor at the university did he display any conspicuous talents. But he had long been interested in chapbooks and the ballads of the peasantry and had attempted verse. Disliking his tutor and his studies, humiliated by his position, and becoming involved in trouble over a convivial entertainment in his college rooms, at which, contrary to rules, persons of both sexes were present, he sold his books and ran away to Cork. Through the influence of his brother Henry he was induced to return to the university, where he was graduated B.A. (Feb. 27, 1749). His uncle, the Rev. Thomas Contarine, who had helped Goldsmith at the university, now tried to induce him to take orders. He became a candidate for the ministry, but was rejected, on what grounds history does not record, by the Bishop of Elphin. Thereupon he went to Cork to embark for America, but missed his ship. His uncle next gave him £50 to study law in London; but Goldsmith soon returned, having got no farther than Dublin, where he lost his money at a gaming house. Again aided by Mr. Contarine, he succeeded in reaching Edinburgh, where he began the study of medicine in 1752; but towards the end of the next year he sailed for Leyden and then set out on the grand tour, wandering on foot through Flanders, France, Germany, and Italy, paying while in France for the hospitality of the peasants by playing on his flute. In 1756 he returned to England with empty pockets and soon began to practice medicine in Southwark. He quickly abandoned his profession to become, in turn, proof reader, usher in an academy at Peckham, and then hack writer at "an adequate salary" for the *Monthly Review*. In 1758 he was nominated physician and surgeon in the India service, but the appointment was not confirmed; and being examined the same year at Surgeons' Hall for the post of "hospital mate," he was found "not qualified." The very clothes in which he appeared before his examiners were borrowed; and, being in great distress, he pawned them.

Besides several articles in the *Monthly Review*, Goldsmith had by this time translated the *Memoirs of Jean Marteilhe of Bergerac* (1758). In April of the next year he attracted some attention by the *Enquiry into the Present State of Polite Learning in Europe*. He was employed on three periodicals started in this year, writing probably all the articles for the *Bee*, a weekly that ran through only eight numbers. On Jan. 24, 1760, he contributed to the *Public Ledger* the first of the celebrated

letters of a Chinese, which were collected and published in book form two years later under the title of *The Citizen of the World*. In 1762 appeared also the *Life of Richard Nash*, the famous Bath beau. His literary work had already gained him the friendship of Bishop Percy and Dr. Johnson. In 1764 the Literary Club was founded, and Goldsmith was one of the nine original members. He was thus brought into intimacy with some of the most eminent men of the time. This year he published 1 *History of England*, in a series of letters, which was followed by "The Traveler" in 1764, a poem which placed him at once in the front rank of contemporary poets. In 1766 came his only novel, *The Vicar of Wakefield*, which, with all its faults, is one of the most delightful stories in English literature. It has passed through more than 100 editions. Turning now to the drama, he produced *The Good-Natured Man*, performed at Covent Garden, Jan. 29, 1768. It did not meet with great favor. Disheartened, he turned again to hack work; but in 1770 he published his finest poem, "The Deserted Village." On March 15, 1773, *She Stoops to Conquer*, unsurpassed among later English comedies, was performed at Covent Garden, and met with instant success. Goldsmith died in his chambers at the Middle Temple, April 4, 1774, and was buried in the grounds of the Temple Church. The Literary Club erected a monument to his memory in Westminster Abbey, bearing an epitaph by Dr. Johnson. His statue stands at the portal of Trinity College, Dublin. While Goldsmith was producing his finest work, he was also compiling histories and writing reviews. Among productions not mentioned above are: *The History of Greece* (1774); the incomplete *History of Animated Nature* (1774); and the delightful poems, "Retaliation" (1774) and "The Haunch of Venison" (1776). Goldsmith did not possess Johnson's massive intellect, nor Burke's passion and general force; but he wrote the finest poem, the most charming novel, and—with the exception perhaps of *The School for Scandal*—the best comedy of the period. Than his style, nothing could be more natural, simple, and graceful. For his life, consult the memoir from Bishop Percy's materials in *Miscellaneous Works* (London, 1831); Forster (ib., 1848; enlarged ed., 1854); Irving (New York, 1849); Black, in *English Men of Letters* (London, 1879); Dobson, in *Great Writers* (ib., 1888); the critical biography by H. S. Krans in the first volume of the *Turk's Head* edition (10 vols., New York, 1908), which emphasizes the Irish aspects of Goldsmith's work; Moore, *Life of Oliver Goldsmith* (London, 1910); also Boswell, *Life of Dr. Johnson* (ib., 1889), and the Wakefield edition of the *Complete Works* (12 vols., ib., 1900). J. J. Kelly's *Early Haunts of Oliver Goldsmith* (Dublin, 1905) contains original material concerning the topic indicated by the title of this book, and also strong arguments in favor of Elphin as Goldsmith's birthplace.

**GOLDSMITH, OLIVER** (?1787-c.1848). A Canadian writer. He was born in Annapolis County, Nova Scotia, and was educated in the public schools, entered the commissarial department as a clerk, and eventually attained the rank of commissary general. He collected material for, but never published, a biographical work on the distinguished men of Nova Scotia. His poem, *The Rising Village* (1825), was highly

praised. It commemorates the busy life of a new settlement and is a sentimental contrast to *The Deserted Village* of the distinguished relative for whom he was named. See CANADIAN LITERATURE.

**GOLDSMITH BEETLE.** A large scarabæid beetle (*Cotalpa lanigera*) of the eastern United



GOLDSMITH BEETLE.  
(*Cotalpa lanigera*.)

States, allied to the dung beetles, and golden yellow in color. The specific name *lanigera*, or wool bearer, refers to the dense hairy coat which covers the underside of the body. It is especially fond of willow trees, where it hides and nests among the leaves in the daytime, going abroad only at night. It deposits its large eggs singly in the soil, and the larval stages,

which extend over about three years, are passed underground. The name is applied in a more general way to all the beetles of the group Rutelinae, of which many of the largest and most brilliantly metallic inhabit Central America.

**GOLDSMITH MAID.** A bay trotting mare, sired by Abdallah, and famous between 1806 and 1878. In 1871 she took the mile trotting record from Dexter in 2:17; but in 1874 was beaten by Rarus (2:13¼).

**GOLDSMITH'S WORK.** See JEWELRY; PLATE.

**GOLD STICK.** An officer in the English Royal Bodyguard, and a captain in the Corps of Gentlemen-at-Arms. They are so called because, on state occasions, they carry a gilded baton. See GENTLEMEN-AT-ARMS.

**GOLDSTÜCKER,** gölt'shtük-ër, THEODOR (1821-72). A German-English Sanskrit scholar. He was born of Jewish parents at Königsberg, Prussia, and was educated in that city and in Bonn and Paris, where he studied under Burnouf. After a visit to England and a sojourn of two years at Königsberg, he went to Berlin, where he contributed valuable material on Indian affairs to Humboldt's *Kosmos*. Expelled from Berlin because of his political opinions in 1848, he accepted Wilson's invitation to come to England and in 1852 was appointed professor of Sanskrit at University College, London. During an activity of nearly 30 years at that institution he did much towards the advancement of Oriental science. He was an able controversialist, but frequently permitted himself to be carried too far in his attacks on such distinguished scholars of the German school as Böhtlingk, Weber, and others. He began an extensive revision of Wilson's *Sanskrit and English Dictionary* in 1856, but was obliged to interrupt this colossal undertaking before reaching the end of the letter A (480 pp., London, 1856-64). His writings include: *On the Deficiencies in the Present Administration of Hindu Law* (1871); *Pāṇini: His Place in Sanskrit Literature* (1861); an anonymous translation of Krishna Miśra's *Prabodha-Chandrodāya* (Königsberg, 1842); and his posthumous edition of the *Mahābhāṣya* (3 vols., London, 1874), which also contains a biographical note (vol. i, pp. 5-16). Many of his minor contributions are collected in his *Literary Remains* (2 vols., London, 1879).

**GOLD THREAD.** See COPTIS.

**GOLD'TIT,** or VERDIN. A most curious little bird (*Auriparus flaviceps*) of the titmouse family (Paridae). It is 4 inches long, and abundant in the valleys of the Rio Grande and Colorado and in Lower California. The upper parts are ashy, the under parts whitish, and the whole head golden yellow. Its habits and manner partake of those of both the chickadees and the warblers; and it makes a remarkable nest, often as large as a man's head, woven of twigs into a globular mass, and placed in a thorny tree. It is lined with down and feathers, and the eggs are four to six, pale bluish speckled with brown. Consult Coues, *Birds of the Colorado Valley* (Washington, 1878).

**GOLD WASP.** See CUCKOO FLY.

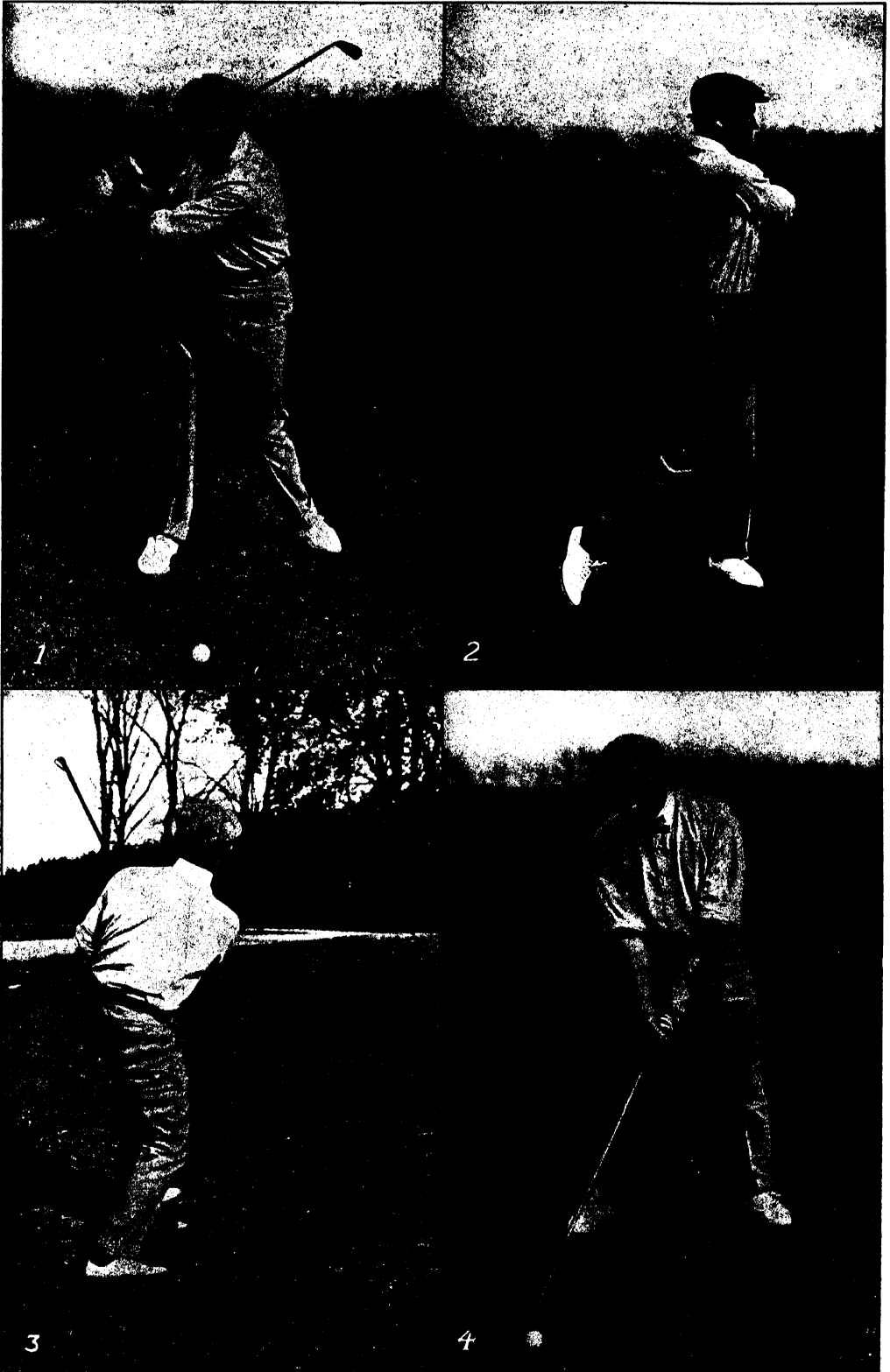
**GOLDZIEHER,** gölt'së-ër, IGNAZ (1850-). An Hungarian Orientalist, born at Stuhlweissenburg. He studied at the universities of Budapest, Berlin, and Leipzig, and made special investigation of Oriental manuscripts in the libraries of Leyden and Vienna. He was appointed a lecturer at the University of Budapest in 1872 and became professor there in 1894. In 1876 he was elected a corresponding member, and in 1892 a full member, of the Hungarian Academy. He visited Egypt, Syria, and Palestine in 1873-74. His writings in Hungarian comprise a large number of contributions to the publications of the Academy, including papers on Oriental bookmaking (1874), on the history of philological study among the Arabs (1878), and on the progress and results of archaeology in Palestine (1886). His chief publications are in German, among them such scholarly works as *Studien über Tanchûm Jerûschalmi* (1871); the treatise *Der Mythos bei den Hebräern und seine geschichtliche Entwicklung* (1876; Eng. trans., 1877); *Mohammedanische Studien* (2 vols., 1889-90); *Abhandlungen zur arabischen Philologie* (2 vols., 1896-99); *Vorlesungen über den Islam* (1910; Hung. trans., 1912; Fr. trans. by Arin, 1914). Goldziher is considered one of the foremost European scholars in subjects connected with Mohammedanism.

**GOLER,** GEORGE W. (1864-). An American health officer. He was born in Brooklyn, N. Y., and graduated from the medical department of the University of Buffalo in 1889. Between 1888 and 1897 he served at the Infants' Hospital at Charlotte, N. Y.; was medical inspector of the Rochester (N. Y.) Board of Health in 1892-96, and health officer after 1896. In 1897 he established in Rochester municipal milk depots that have served as models for health officers throughout the United States and Europe. In addition, Dr. Goler instituted a vigorous and sustained campaign against unsanitary conditions in the dairy farms forming the source of the city's milk supply. In 1904 he became attending physician of the Rochester Hospital for Infectious Diseases, which he had been instrumental in founding. He served at one time as president of the Hospital Medical Society and is author of papers on the problems of milk supply and on tuberculosis.

**GOLETTA.** The port of Tunis, Africa.

**GOLF** (perhaps from Dutch *kolf*, OHG. *cholbo*, Ger. *Kolbe*, *Kolben*, club, Icel. *kolfr*, *bolit*, *kylfa*, club). Par excellence, the national game of Scotland, though possibly of Dutch origin. The Romans had a game called *paganica*, played with a crooked stick and a ball of leather stuffed with feathers, and in England, during the reign of

# GOLF



1. TOP OF THE SWING  
2. FINISH

3. HALF MASHIE SHOT  
4. ADDRESSING THE BALL



Edward III, the game was called *bandy ball*, or *cambuca*. The Dutch game differs greatly from the Scottish, and it is maintained that golf is a lineal descendant of the game of *shinty*, but it is more probable that it is a combination of both. Shinty is a rude game of force; golf, a game of skill.

In 1457 golf was so much played in Scotland that it took the place of archery and other ancient games. The year following, Parliament passed an act that the game be abandoned, and it was not until 1491 that Parliament ceased to interfere with it.

In 1592 the Town Council of Edinburgh ordained that none of the inhabitants "be sene at any pastymes or gammis within or without the town upoun the Sabbath-day sic as Golf, Archerie, etc." Even during the seventeenth century similar acts were passed, and offenders were severely punished. This extract from the Kirk-Session Books of the Parish of Cullen, Banffshire, is an excellent example: 1641. "James and George Duffus and Charles Stevinson convict in break of ye Sabbath for playing at ye golf eftornyne in time of sermone and yrfur are ordaynev eeric aue of them to pay half a merk and mak yr repentance ye next Sabbath." When James VI of Scotland succeeded Queen Elizabeth on the English throne, his Scottish train played the game on Blackheath; whereby came about the curious fact that the oldest organized golf club is English. It was an exotic, however, and remained the only one south of the Tweed for 250 years. James VI secured a special "club-maker to his Hienes" and therefore established a monopoly of ball making to prevent gold and silver from going out of his kingdom for buying golf balls. The Duke of York (afterward James II) was very fond of the game, and one day, with an Edinburgh shoemaker as his partner, he defended Scotland's claims in the sport against two English noblemen. The Duke and his partner completely outplayed their opponents in the foursome. This was the first great match of which we have record. Meanwhile in Scotland the game maintained its popularity and was so generally indulged in by all classes of society that any village in East Lothian could be sure of competitors, from the village cobbler to the laird of the neighborhood. The early conditions were as democratic as the company.

Henceforward the history of golf is marked mainly by the formation of societies and clubs for the practice and promotion of the game. Some of the most celebrated of these institutions were the Honourable Edinburgh Company of Golfers, the Edinburgh Burgess Golfing Society, and the Royal and Ancient Golf Club of St. Andrews, established in 1754, now the national club of Scotland.

A tent erected upon special occasions was the only rendezvous of the local golfers; and the links were laid out across a tract of common land by the seaside, over which every inhabitant of the district had some right. The prize was seldom more than a club with a silver band round it, or a dozen balls, or later on a simple medal; even the great national prize was only a silver club, and that never became the property of the winner. The association for which the winner played had its custody until the next yearly contest. The earliest implements with which the game was played were practically as good as they are to-day, except in the case

of the balls, which were formerly simply a leather case stuffed with feathers. The two great Scottish associations, while younger than the English one mentioned above, are of far greater importance to the history of the game.

The first clubs established outside Great Britain were the Calcutta Golf Club of East India, established in 1829, and the Royal Bombay Club, incorporated in 1842. Another club was in full vigor in Madras at a somewhat later date. The next foreign settlement was at Pau, in southern France, where numerous Scotchmen were in search of health. It was not until 1864 that the invasion of England proper began, with the establishment of the Golf Club of Westward Ho, in Devonshire, followed in the next year by the London Scottish, at Wimbledon; and shortly afterward by the Hoylake, at Liverpool; and then by hundreds of others throughout the country. Canada caught the infection in the early seventies, resulting in the organization of the Royal Montreal Golf Club in 1873.

In the United States, New York was the first to take up the game, although it is stated that the game of golf was played on the Pacific coast by a band of old sea captains in the sixteenth century. The St. Andrews Golf Club was the first formed in the United States (Nov. 18, 1888), followed almost immediately by others throughout the country, so that at the beginning of the twentieth century public links were to be found in the public parks of the large cities, and nearly every town and village in the country had its public or private golf links.

The game was played with a ball made of gutta-percha having a diameter of 1¾ inches and weighing from 25 to 28 pennyweights. Previous to 1848 the balls had been made of leather stuffed with feathers, and the manufacture was very difficult. During that year the gutta-percha ball was invented and remained in vogue for many years, until the advent of the rubber-cored ball. Many golfers believed that the old gutta-percha ball was better than the present rubber-cored; so a match was planned in England during the latter part of March, 1914, which resulted in a decisive victory for the rubber-cored. Four of England's leading professionals were chosen to participate in the match. The loss of distance to the rubber-cored ball was not great in the driving, but the difference was felt in the second shots, especially when the players using rubber cores could get up comfortably with irons. Their opponents had to slug desperately hard and even then were generally short. In playing the gutta-percha ball every ounce of power had to be utilized, and at the end of the round the gutta-percha professionals were dead. In the afternoon the sides were changed so as to eliminate as much as possible the personal equation.

Golf is played over a course laid out on an open stretch of country, and the object is to hit the ball into each of the holes made for its reception successively in the fewest number of strokes. These holes are about 4 inches in diameter, usually lined with iron to keep them from getting too large, while a flag at each indicates to the golfer the correct direction. The number of holes is usually 18, but where the area available is limited, a nine-hole course is played twice. The distance of each hole from the tee depends upon the nature of the intervening land; from 110 to 650 yards is the usual limit. In laying

them out advantage is taken of such natural obstacles to straightforward play as ditches, walls, trees, hills, roads, or hollow places, so as to break up the total length into difficult portions, compelling the player to exercise judgment and skill. If there are no natural obstacles or hazards, artificial ones are introduced, such as traps made by hollowing out the earth and leaving it loose like sand in front of a hole, or an embankment raised at some selected spot, called a bunker. The game is played by one, two, three, or four persons in either "medal" or "match play." In the former all the strokes of the game on each side are added together at the end of the 18 holes, and the side which has completed the round in the lowest number of total strokes wins; or, if match play, each hole is counted separately to the one who makes it in the fewest strokes, the winner being the one who has most holes to his credit.

The play is begun by one player teeing, or placing his ball on the tee, which is usually a section of ground about 10 feet in diameter, either sand or turf, and striking it with one of his clubs, usually the driver, such a distance as will best land it in a favorable place for the next stroke. Then his opponent drives off, and they both proceed to where their respective balls have fallen. In the ensuing strokes, and the choice of clubs with which to make them, the players must be guided by conditions—the length of the hole, the conformations of the ground to be covered, and the obstacles to be safely passed. The game is divided into three parts—distance shots, approaching, and putting. For the distance shots three clubs are generally used—the driver and the brassie, made of wood, and the driving iron, made of steel. When the ball has been driven to within 100 or 150 yards of the hole, the approach shot, of which the object is accuracy rather than distance, may be made by using the mid-iron, mashie, or mashie-niblick. Around the hole the grass is cut short and the ground made as level as possible. This is called the putting green. Putting, the third department of the game, consists of tapping the ball lightly with a short club with the object of rolling the ball into the hole. The conventional set of clubs consists of the driver, brassie, cleek, mid-iron, mashie, niblick, putter, and driving iron. There are, however, variations of these types, such as the spoon, hollow-faced cleek, jigger, mashie niblick, putting cleek, and many other modern clubs.

The rules are based upon those of the St. Andrews Golf Club of Scotland. Players are of two classes, professional and amateur, and the national championships are three—one for men (amateurs), one for women (amateurs), and an open championship for amateurs and professionals.

In America the central authority is the United States Golf Association, organized Dec. 22, 1894, when it consisted of the Chicago Golf Club, the Country Club of Brookline, the Newport Golf Club, and the St. Andrews Golf Club of Yonkers. It now (1914) consists of nearly 200 clubs, and there are subsidiary associations, the Metropolitan, Western, Southern, Intercollegiate, Western Pennsylvania, Florida, and Trans-Mississippi associations, the League of the Lower Lakes, the Pacific Northwest, New Jersey State, Indiana State, and several women's associations. Not included in these associations

are hundreds of separate clubs. There are over 750,000 golfers in the United States.

In the men's amateur championship the entries are reduced by a preliminary sifting at medal play to the 64 lowest. These then play match play every consecutive day, whereby the numbers are day by day reduced, first to 32, then to 16, then to 8, then to 4, and finally to 2, the finals. The woman's championship is not so exhaustive as the men's. In it the entries are reduced by one round at medal play to 32, who thereafter meet at match play in a round of 18 holes every consecutive day, as in the former case. In England there is sometimes more than one course played over, usually due to the number of entries. The open championship is a contest of four times round the links, 72 holes, at medal play.

Consult: Clark, *Golf: A Royal and Ancient Game* (New York, 1899); Lee, *Golf in America* (ib., 1895); Vardon, *Complete Golf* (ib., 1905); H. G. Hutchinson, *Golf Greens and Green Keeping* (London, 1906); G. W. Beldam, *Great Golfers* (ib., 1907); W. W. Tulloch, *Life of Tom Morris, with Glimpses of St. Andrews and its Golfing Celebrities* (ib., 1907); Hilton and Smith, *The Ancient and Royal Game of Golf* (ib., 1912); A. V. Taylor, *Origines Golfianæ* (Woodstock, Vt., 1912); James Braid, *Advanced Golf* (Philadelphia, 1908); Arnold Haultain, *The Mystery of Golf* (2d ed., New York, 1910); H. G. Hutchinson, *The New Book of Golf* (ib., 1912); Jerome D. Travers, *The Travers Golf Book* (ib., 1913).

**GOLGI**, gól'jé, CAMILLO (1844– ). An Italian histologist and neurologist, born in Corteno and educated at the University of Pavia. He studied medicine, practiced at Abbiategrosso, and was professor at Siena and then at Pavia, where he was director of the histological and general pathological cabinet. In 1870 he first used silver nitrate to color nervous structure and about 1885 revolutionized the theory of nervous physiology by proving that there was not a net, but only an interlacement, of nerves. A class of nerve endings found in tendons are called the "organs of Golgi." His most important work in pathology was the discovery of three varieties of malaria parasite. In 1906 he divided the Nobel prize for medicine with Cajal. His collected works appeared in three volumes in 1903—the first and second on histology, the third on pathology. He wrote for the great Italian medical encyclopedia and for Italian medical journals.

**GOL/GOTHA.** See HOLY SEPTULCHRE.

**GOLIAD.** A town and the county seat of Goliad Co., Tex., 134 miles south of Austin, on the San Antonio River, and on the Galveston, Harrisburg, and San Antonio Railroad (Map: Texas, D 5). It contains a fine courthouse and interesting remains of the old Spanish mission, La Bahía. The town has cotton gins, whose products with live stock constitute a considerable trade. Pop., 1914 (local est.), 2250. Here in 1747 was established the mission Espíritu Santo de Zúñiga, and the presidio of Santa María de Loreto del Espíritu Santo, generally known as La Bahía, which had been founded about 1722 on the site of La Salle's Fort St. Louis and removed to the Guadalupe River about 1727. In 1829 the place was raised to the rank of a villa and was named Goliad (Goliath). In 1812-13, during the war between Mexico and Spain, Gutierrez was be-



sieged here for a short time by a large Spanish force; on Oct. 9, 1835, the place, then garrisoned by a Mexican force of about 50, was captured by an equal number of Texans under Captain Collingsworth. On Dec. 20, 1835, a declaration of Texan independence was made here, several months before the official declaration was made at Washington (Texas), and on March 27, 1836, in what is known as the "massacre of Goliad," more than 300 Texans and Americans under Colonel Fannin were murdered near here in cold blood by the Mexicans, at Santa Anna's orders. See FANNIN, JAMES W.

**GOLIARDIC LITERATURE**, or **CARMINA BURANA**. The songs of the wandering students in the later Middle Ages. These called themselves Goliardi, i.e., children or followers of Goliath. Nothing is definitely known about this Goliath. By some the poems bearing his name have been attributed to Walter Mapes, but there is no possibility that the songs of the Goliards represent the creation of any one man or even of a few men. They bear the stamp of universality. A song, originally sung by one poet or rhymester, was adopted, changed, resung, by others, until it became the common property of the student body. The poems as a whole may be divided into two general classes. The first class comprises the satirical songs. With the impatience and enthusiasm of youth the students attacked the vices of all classes except their own, and the members of the Church fared worst. Their poems are exceedingly irreverent to the ecclesiastical dignitaries, and this fact alone was sufficient to prevent any author from putting his name to his verses. In the second class the noticeable facts are the purely pagan spirit, the love of outdoor life, the zest for enjoyment, the feeling that all things which yield pleasure are lawful. Their themes are three—nature, wine, and women—all of which they loved ardently. Some of their songs are popular at the present time. The German Corps students still sing at the grave of a departed brother, *Gaudeamus igitur, juvenes dum sumus*. The best known of the drinking songs is *Mihi est propositum in taberna mori*. The *Lauriger Horatius* is believed to be the work of the Goliardi. Consult: Symonds, *Wine, Women, and Song* (London, 1884); Schmieller, *Carmina Burana* (3d ed., Breslau, 1894); Wright, "Latin Poems Commonly Attributed to Walter Mapes," in *Camden Society Publications* (London, 1841); Pernwerth von Bärnstein, *Carmina Burana Selecta* (Wurzburg, 1879); Haessher, *Die Goliardendichtung und die Satire im 13. Jahrhundert in England* (Leipzig, 1905); Lundius, *Deutsche Vagantenlieder in den Carmina Burana* (Kiel, 1907); Wright, *History of French Literature* (New York, 1912).

**GOLIAS**. See GOLIARDIC LITERATURE.

**GOLI'ATH**. A Philistine giant, born in Gath, and slain by a Judæan hero. According to 1 Sam. xvii, it was the youthful David who killed this giant, felling him with a stone from his sling and cutting off his head with the fallen champion's sword. (See DAVID.) An older and more reliable tradition ascribes the deed to one of David's warriors, Elhanan, of Bethlehem (2 Sam. xxi. 19). If this Elhanan is identical with Elhanan ben Dodo, of Bethlehem, mentioned in 2 Sam. xxiii. 24, his father's name, Dodo, is omitted in 2 Sam. xxi. 19, and the reading "Jairi," "the Jairite," indicating the clan to which he belonged, should be preferred to

"Jair," supposed to be the name of his father. In that case the name of Dodo and the birth-place may have facilitated the transfer of the story to David. It is a common occurrence, however, that a famous king receives the credit for deeds done by his men. In 1 Chron. xx. 4-8, Elhanan is said to have slain Lahmi, the brother of Goliath, and in the Authorized Version the words "the brother of" are introduced, without the slightest warrant either in the Hebrew text or the ancient version, to accord with this. By a comparatively slight emendation, which fortunately the Samuel text escaped, the Chronicler or a later copyist harmonized the two narratives.

**GOLIATH BEETLE**. Any of several huge cetonian beetles of the family Scarabæidæ and genus *Goliathus*, specifically *Goliathus giganteus*, which is about 4 inches long by 2 inches wide. This species is West African, and according to Uhler is subject to so much variation that several names have been given to its varieties. It is generally chalky white, with velvety-black markings, prominently six black lines on the prothorax. These beetles frequent the tops of forest trees and are said to feed on the sap. They are near allies of the Hercules beetles (q.v.).

**GOLITZIN**, gô-lits'in, or **GALITZIN**. A princely family of Russia, tracing its descent from Gedimin, Grand Prince of Lithuania, ancestor of the Jagellon kings of Poland.—**PRINCE MIKHAIL GOLITZIN** was a celebrated military commander under Basil IV, Grand Prince of Moscow. He fought in the Crimea and in Lithuania and in 1514 led an army against the Poles. He was defeated at Orsha and taken prisoner, remaining in captivity until 1552. He died in a convent at Moscow soon after his release.—**VASILY VASILYEVITCH GOLITZIN**, great-grandson of Mikhail, played an important rôle at the time of Boris Godunoff and the false Demetrius. He was sent as Ambassador to Poland with the offer of the Russian crown for Prince Ladislas, but was cast into prison by the Poles, and died in 1619.—**BORIS ALEXEYEVITCH GOLITZIN** (1641-c.1713) was the preceptor of Peter the Great and one of the regents of the Empire during Peter's travels abroad. He became subsequently Governor of Kazan and Astrakhan and enjoyed great favor with the Czar.—**VASILY VASILYEVITCH GOLITZIN**, known as the Great (1643-1714), distinguished himself in military operations against the Cossacks of the Dnieper, gained the title of Ataman, and after 1680 was Minister of State. He was the lover of Sophia, sister of Peter the Great, who acted as regent during the young ruler's minority. As such, Golitzin was the virtual ruler of Russia, carrying on the government with great ability and firmness. He made the beginnings of military reform, thus preparing the way for the thorough organization of the army by Peter the Great. Upon the assumption of the government by Peter in 1689, Vasily suffered disgrace and was banished to Siberia, where he died. (Consult R. N. Bain, *The First Romanoffs*, London, 1905.)—**DMITRI GOLITZIN** (died 1738) was Russian Ambassador to Turkey and Austria and subsequently Superintendent of the Imperial Finances. He was one of the leaders of the aristocratic party which, upon the accession of Anna Ivanovna (q.v.), sought to impose a constitution upon the Empress by the terms of which the chief power would have

been vested in the hands of a small faction of the nobility. The attempt, however, failed, and Dmitri died in prison at Schlüsselburg.—**MIKHAIL GOLITZIN** (1674–1730), brother of Vasily, entered the army at the age of 12 and early distinguished himself against the Turks. In 1700 he commanded a Russian corps, operating against the Swedes in Lithuania; in 1708 he gained the important victory of Lysenaya and in 1714 overran Finland and was Governor of the country until 1721, in which year he conducted the negotiations leading to the Peace of Nystad. Golitzin was one of the greatest generals Russia has ever produced and a man of many abilities and admirable character. As Governor of Finland, his conduct was marked by such justice and kindness as to gain him, from a conquered population, the title of *Fins-kibog* (Godhead of the Finns).—**ALEXANDER MIKHAILOVITCH GOLITZIN** (1718–83), son of Mikhail, after acting in the diplomatic service of Russia at Constantinople and Dresden, entered the army and fought with distinction in the Seven Years' War. In 1760 he took Khotin from the Turks. He was subsequently Governor of St. Petersburg and field marshal.—**DMITRI ALEXEYEVITCH GOLITZIN** (1735–1803) was a well-known diplomat and man of letters. From 1765 to 1773 he was Russian Ambassador at Paris, where he lived in close touch with Voltaire and other literary men of the time. In 1773 he became Ambassador at The Hague, whence, on the outbreak of the French Revolution, he retired to Germany, where he devoted himself to the study of the physical sciences. He wrote: *Description physique de la Tauride* (1788); *Traité de minéralogie* (1792); *L'Esprit des économistes* (1796).—His wife, **ADELHEID AMALIE** (1748–1806), was a fervent Catholic. She made her home at Münster and became the centre of a band of religious enthusiasts and mystics, whose efforts were directed towards counteracting the prevailing materialism of the age. Her son **DMITRI** was a Catholic missionary in the United States. (See **GAL-LITZIN**, **DMITRI**.)—**ALEXANDER NIKOLAYEVITCH GOLITZIN** (1774–1844) was one of the most influential counselors of Alexander I, with whom he had been brought up. He became Procurator of the Holy Synod in 1803 and from 1817 to 1824 was Minister of Education and Public Worship. His liberal views aroused the opposition of the conservative element among the clergy, and with the accession of Nicholas I he lost all influence. (Consult Angelo S. Rappoport, *The Curse of the Romanovs*, London, 1907.)—**EMANUEL MIKHAILOVITCH GOLITZIN** (1804–53) was born in Paris and studied at the Ecole Polytechnique under Gay-Lussac. He entered the Russian army in 1825 and distinguished himself at the storming of Varna (1828), but retired from the army in the following year. He led a life of dilettante scholarship in the capitals of western Europe, his chief interest lying in geography. He contributed to the *Bulletin de la Société de Géographie* in Paris and translated Ferdinand von Wrangel's *Voyage to Siberia* from the Russian. He also wrote *La Russie du 17ème siècle dans ses rapports avec l'Europe occidentale*, which was published two years after his death.—**NIKOLAI SERGEYEVITCH GOLITZIN** (1808–92) entered the army in 1825 and rose to be lieutenant general. He wrote *A Military History of the World from the Most Ancient Times* (13 vols., 1872 et seq.).

**GOLIUS**, gō'li-ūs, **JACOBUS** (1596–1667). A Dutch Orientalist and mathematician, born at The Hague and educated at the University of Leyden. In 1624 he became professor of Arabic at Leyden and in 1629 professor of mathematics. He wrote *Lexicon Arabico-Latinum* (1653).

**GOLLANCZ**, gōl'āpks, **ISRAEL** (1864– ). An English scholar, professor of English literature in King's College, University of London, and secretary of the British Academy. He was born in London, graduated from Cambridge (B.A., 1887; M.A., 1891), became lecturer in English at University College, London (1892–95), and lectured in university extension courses and at Cambridge. He edited and translated many Old and Middle English texts, as the *Pearl* (1891), *Cynwulf's Christ* (1892), and the *Exeter Book* (1895). He edited the *Temple Shakespeare* (1894–96) and *Hamlet in Iceland* (1898). In 1913 he was, as he had been for some years previous to that date, general editor of *The King's Library*.

**GOL'OMYN'KA**. See OIL FISH; BAIKAL.

**GOL'ONDRINA**. The common green house-swallow (*Tachycineta leucorrhoa*), abundant everywhere south of the Amazonian forests. It is closely related to the white-bellied tree swallow of the United States, and, like that and other species, has forsaken its native wildness and custom of nesting in hollow trees for intimate association with men, and nest making beneath the eaves of buildings. It is richly green, with a white breast and rump. Many interesting things are related of it by Hudson, *Naturalist in La Plata* (4th ed., London, 1903). See SWALLOW.

**GOLOSHES**, gō-lōsh'ez (Fr. *galoche*, ML. *calopedes*, Gk. *καλοπόδιον*, from *kālon*, wood + *poús*, foot). Originally wooden sandals or shoes; later, large, high overshoes; now, warm and heavy overshoes of rubber and cloth, buckling around the ankle. See SHOES.

**GOLOVATSKY**, gō'lō-vit'skē, **YAKOV FEODOROVITCH** (1814–88). A Russian (Ruthenian) ethnographer, born in Czeplele, eastern Galicia. After study at Pest and Lemberg, he became professor of the Russian language and literature at the University of Lemberg in 1848. From 1867 he resided in Russia. His chief work is a collection of the folk songs of the Russian peoples in Galicia, Hungary, and Bukowina, *Narodnyia pēsni Galickoi i Ugorskoj Rusi* (1878).

**GOLOVNIN**, gō-lōv-nēn'. A native settlement on Golovnin Bay, Alaska, 10 miles east of Bluff. It has a population of about 200. The United States maintains a school, and the Swedish Evangelical Union conducts a mission. The natives have reindeer herds exceeding 2000 head. See SEWARD PENINSULA, ALASKA.

**GOLOVNIN**, VASSILI MIKHAILOVITCH (1776–1831). A Russian sailor and explorer, born at Ryazan. He served in the English navy under Nelson and Cornwallis, and on his return to Russia in 1806 was put in command of the sloop *Diana* to make a trip of exploration around the world. In 1811 he was captured in Japan and kept prisoner until 1813. A second trip around the world was made (1817–19) in the Russian corvette *Kamchatka*. From 1821 till his death he held the highest positions in the Russian navy, dying with the rank of vice admiral. His complete works, which contain descriptions of both voyages and of his adventures while in captivity, were published in five volumes at St. Petersburg in 1864. Golovnin Bay and Golovnin Sound, in Bering Sea, are named for him.

**GOLP**, or **GOLPE**. A heraldic charge. See **HERALDRY**.

**GOLTERMANN**, gól'tér-mán, GEORG EDUARD (1824-98). A German violoncellist and composer. He was born at Hanover and received his musical education under Prell, Menter, and Lachner. After completing his studies he traveled for two years giving concerts, in which he frequently performed his own highly successful compositions. In 1852 he received a position as musical director at Würzburg and in the following year was appointed assistant conductor of the orchestra of the Stadttheater at Frankfurt on the Main, of which he became chief conductor in 1874. Besides a symphony (1851) and two *Festspiel-Overtures* (op. 24 and 94), his compositions include sonatas, songs, and numerous works for the violoncello.

**GOLTHER**, gól'tér, WOLFGANG (1863- ). A German writer on ancient and mediæval German legends. He was born in Stuttgart and was educated at the University of Munich. In 1895 he became professor of German philology at Rostock, where he was rector of the university in 1909-10. He wrote: *Das Rolandslied der Pfaffen Konrad* (1887); *Die Sage von Tristan und Isolde* (1887); *Studien zur germanischen Sagengeschichte* (1888); *Geschichte der deutschen Litteratur im Mittel-Alter* (1891); *Deutsche Heldensage* (1894; 2d ed., 1909); *Götterglaube der Germanen* (1894; 2d ed., 1911); *Handbuch der germanischen Mythologie* (1895); *Die sagengeschichtlichen Grundlagen der Rindichtung Richard Wagners* (1902); *Wagner als Dichter* (1904); *Altnordische Literaturgeschichte* (1905); *Religion und Mythos der Germanen* (1909); *Die deutsche Dichtung im Mittel-Alter* (1912); *Parsifal und der Gral* (1913); and edited various early texts and Richard Wagner's letters and (1914) his collected works.

**GOLTZ**, gólts, ALEXANDER D. (1857- ). An Austrian historical and decorative painter. He was born in Hungary, of German parentage, but was brought up in Vienna. Beginning to paint at his fourteenth year, he studied in the academies of Vienna and Munich, especially under Feuerbach, and at Paris with Puvis de Chavannes. One of the most prominent contemporary painters of Austria, he is represented especially in the museums of Vienna: in the Hof Museum by "Christ and the Women," in the Municipal Museum by "A Peasant Madonna," and in the Moderna Gallerie by "Vintage in Lower Austria." He is widely known as a decorative painter, having painted the curtains of the court theatre at Wiesbaden, and of the city theatre at Salzburg, and decorated the aula of the University of Graz. He painted, besides, many portraits and figures, and landscapes, chiefly of his home in Lower Austria.

**GOLTZ**, AUGUST FRIEDRICH FERDINAND, COUNT VON DER (1765-1832). A Prussian statesman, born at Dresden and educated at Leipzig and Frankfurt on the Oder, where he studied law. He was Prussian Ambassador to Denmark, Sweden, and Russia; was the Plenipotentiary of Prussia at the Congress of Erfurt (1808); and concluded the last negotiations (1812) with France under direction of Hardenberg. After the termination of the Napoleonic wars he was appointed Prussian Councillor of State (1817), and was member of the Bundestag of Prussia in 1817-24.

**GOLTZ**, BOGUMIL (1801-70). A German humorist, satirist, and moral philosopher. He

was born in Warsaw, attended the Gymnasia at Marienwerder and Königsberg, studied agriculture from 1817 to 1821, and for a time attended lectures on philosophy and philology at the University of Breslau. In 1823 he purchased, near Thorn, an estate which he subsequently abandoned to settle in Gollub and devote himself to the study of literature and æsthetics. In 1847 he removed to Thorn, whence he made extensive travels and where he died. In 1847 appeared his *Buch der Kindheit*, in which, with a mystic tenderness akin to that of Jean Paul, he depicts the impressions of his own childhood. This was followed by *Ein Jugendleben* (1851), in similar vein. *Der Mensch und die Leute* (1858) is a penetrative and peculiarly original study of various races, *Die Deutschen* (1860) revealing the same method applied to the German national genius. He was a profound though eccentric thinker; but his style, though often spirited, lacks technical finish and frequently displays the grotesqueness of Jean Paul without the latter's imagination. His further works include: *Ein Kleinstadter in Aegypten* (1853); *Typen der Gesellschaft* (2 vols., 1860); *Feigenblätter* (1861-64); *Die Bildung und die Gebildeten* (1864); *Die Weltklugheit und die Lebensweisheit* (1869).

**GOLTZ**, FRIEDRICH (1834-1902). A German physiologist, born at Posen. He was educated at Königsberg and was there appointed a professor in 1865. In 1870 he became professor of physiology at Halle and from 1872 to his retirement in 1901 occupied a similar chair at Strassburg. His most important researches concern the functions of the nerve centres and in particular reflex nervous action. His writings include: *Beiträge zur Lehre von den Funktionen der Nervencentren des Frosches* (1869) and many contributions to the *Archiv für pathologische Anatomie, Physiologie und klinische Medizin* of Virchow.

**GOLTZ**, KOLMAR, BARON VON DER (1843-1916). A German soldier and military author. He was born at Bielkenfeld, East Prussia, was educated at the Military Academy, Berlin, and served in the Austro-Prussian War of 1866. After the Franco-German War, in which he participated, he was appointed to the historical department of the general staff at Berlin and subsequently became instructor in the Military Academy. He resigned from the German service in 1883 and entered that of Turkey, where he conducted the department of military education until 1896. In that year he returned to Germany and was made general of division. He became general of infantry in 1900, commander of the First Army Corps in 1902, in 1907 general inspector of the Sixth Army Corps, in 1908 lieutenant general, and in 1908-10 he reorganized the Turkish army. Made general field marshal in 1911, he was afterward general inspector of the Second Army Corps until 1913. In August, 1914, he was appointed military governor of Belgium after the German armies had successfully invaded that country and captured Brussels. (See **WAR IN EUROPE**.) His works include: *Léon Gambetta und seine Armee* (1877; also translated into French, 1877); *Das Volk in Waffen* (4th ed., 1890); *Der thessalische Krieg und die türkische Armee* (1898); *Krieg- und Heerführung* (1901); *Von Jena bis Eylan* (1907); *Kriegsgeschichte Deutschlands im XIX. Jahrhundert* (1910).

**GOLTZ**, MAX, BARON VON DER (1838-1906).

A German naval officer, born at Königsberg. He entered the Prussian marine in 1853, was appointed naval ensign in 1859, in 1870 was detailed for service in the Ministry of Marine, and in 1875 attained the rank of captain. During the disturbances in Egypt in 1882 he was commanding officer of Germany's Mediterranean squadron, in 1888 became vice admiral and commander of the Wilhelmshaven Naval Station, and in 1895 was retired, with the rank of admiral, at his own request.

**GOLTZ, THEODOR, BARON VON DER** (1836-1905). A German agriculturist, born at Coblenz and educated at Erlangen and Bonn. In 1862 he was appointed instructor at the Royal Academy of Walldau, East Prussia, into which province he introduced the first agricultural schools. He was professor of agriculture at Königsberg from 1869 to 1875, when he was appointed director of the Agricultural Institute in that city. In 1885 he was made professor of agriculture at Jena and in 1895 at Bonn. His publications include: *Die landwirtschaftliche Buchführung* (9th ed., 1903); *Landwirtschaftliche Taxationslehre* (3d ed., 1903); *Agrarische Aufgaben der Gegenwart* (2d ed., 1895); *Leitfaden der landwirtschaftlichen Betriebslehre* (1897; new ed., 1911); *Vorlesungen über Agrarwesen und Agrarpolitik* (1899); *Handbuch der landwirtschaftlichen Betriebslehre* (1896; 4th ed., 1912); *Geschichte der deutschen Landwirtschaft* (1902-03).

**GOLTZIUS, göl'tsi-us, HENDRIK** (1558-1616). A Dutch line engraver and painter. He was born at Mülbecht, near Venloo, of a family of artists. He was a pupil of Coornheert, and of Philip Galle, at Haarlem, where he later set up as a printer. In 1850 he began a tour of several years through Germany and Italy; he was much influenced by Michelangelo. In his later years he executed several paintings in a mannered Italian style, much inferior to his engravings. In his command of the burin Goltzius was hardly surpassed by Dürer himself, although he lacked the latter's imagination and invention. He made great progress in the plastic treatment of engraving, his modeling being especially fine. His remarkable ability to adapt his technique to any style is evinced in his six master prints: "The Annunciation," after Raphael; "The Visitation," after Parmegiano; "The Adoration of the Shepherds," after Bassano; "The Holy Family," after Baroccio; "The Adoration of the Kings," after Lucas van Leiden; and "The Circumcision," after Dürer. However excellent in technique, most of his engravings, of which about 330 survive, are mannered in form and hollow in content. His engraved portraits, however, are excellent in finish as in characterization. One of the best is the life-size portrait head of the artist himself.

**GOLUCHOWSKI, göl'oo-köv'ski, AGENOR, COUNT VON** (1812-75). An Austrian statesman, born in Galicia and educated at the Jesuit Convent of Tarnopol and at Lemberg. He entered government service and was Governor of Galicia from 1847 till 1859, when he was made Minister of the Interior. He gave up this position in 1860 and the next year entered the House of Lords. In 1866-67, and from 1871 until his death, he was again Governor of Galicia and very active in favoring the thorough Polonization of the province.

**GOLUCHOWSKI, AGENOR, COUNT** (1849-). An Austrian statesman, son of the preceding. He was early in the diplomatic service

as attaché at Berlin (1872), attaché and counselor at Paris, and Minister at Bucharest (1887-94). As Austro-Hungarian Minister of Foreign Affairs (1895-1906), he made the maintenance of the Triple Alliance and especially of close relations with Germany the basis of his policy; temporarily, as it proved, he adjusted with Russia Balkan difficulties; he arranged for concerted action of the European powers during the Armenian difficulties of 1896, and again in 1902 urged joint action in obliging the Sultan to grant reforms in Macedonia. In 1905 he also led the concert of Powers in forcing Turkey by an international naval demonstration to accept European control of Macedonian finances. The Hungarians, who hated Goluchowski, finally compelled him to retire from the ministry.

**GÓMARA, gómä-rä, FRANCISCO LÓPEZ DE** (1510-c.1559). A Spanish historian, born at Seville. He studied at the University of Alcalá and became professor of rhetoric there. Leaving the university, he took orders and about 1540 became secretary and chaplain to Hernando Cortés. In this capacity he may have gone with him to America, but it is not probable. He wrote one of the first histories of America, which, however, is not reliable. The title of the work is *Historia general de las Indias con la conquista de México y de la Nueva España* (1552-53). The second part of this work described Mexico and was reprinted as a separate volume, *Crónica de la Nueva España, con la conquista de México . . .* (1554). A modern edition, with a biography, is in the *Biblioteca de autores españoles*, vol. xxii (Madrid, 1884).

**GÓMARUS, FRANCIS** (1563-1641). The most strenuous opponent of Arminius. He was born at Bruges, Jan. 30, 1563, studied at Neustadt, Heidelberg, Oxford, and Cambridge, where he received the degree of B.D. in 1584. He was pastor of the Reformed church at Frankfort from 1587 till 1594, when he became professor of theology at Leyden. Here he signalized himself by his vehement opposition to the views of Arminius, who became his colleague in 1603. In the disputation at The Hague in 1608 his zeal was very conspicuous; and at the Synod of Dort (1618-19) he was mainly instrumental in securing the expulsion of the Arminians from the Reformed church. Gomarus resigned his professorship when, after the death of Arminius, an Arminian was appointed to the vacancy (1609). He was professor at Saumur (1614-18) and at Groningen from 1618 till his death (Jan. 11, 1641). Though prejudiced, even bigoted, and more Calvinistic than Calvin himself, nevertheless Gomarus was a man of learning, and not the contentious personage he is sometimes represented. His works were published at Amsterdam after his death (1645). Those who sided with Gomarus in the Arminian controversy are often called, from his name, Gomarists. See ARMINIUS, JACOBUS; ARMINIANISM; DORT, SYNOD OF.

**GOMBERG, MOSES** (1866-). An American chemist. He was born at Elizabetgrad, Russia, where he was educated at the Gymnasium; in 1890 he graduated from the University of Michigan (M.S., 1892; Sc.D., 1894); and he also studied at the universities of Munich (1896-97) and Heidelberg (1897). At the University of Michigan he became instructor in chemistry in 1893, assistant professor of organic chemistry in 1899, junior professor in 1902, and full professor in 1904. He is author of con-

tributions to the *Journal of the American Chemical Society*, the *Berichte der Deutsche Chemische Gesellschaft*, and other periodicals, dealing especially with quino-carbonium salts, tetraphenylmethane, and trivalent carbon.

**GOMBERVILLE**, gŏn'bâr'vêl', MARIN LE ROY, SIEUR DU PARC ET DE (1600-74). A French novelist of considerable imaginative originality, one of the first to make the novel a vehicle of exotic and geographic description and of historic information. He was born in Paris and was a wealthy nobleman, a cherished member of the Précieux bluestocking circle, to whose vocabulary he contributed some gems, as may be seen from Somaise's *Dictionnaire des précieux*. While still a youth, he wrote *Carthée* (1621), whose heroine furnished the type for Sorel's burlesque Dulcinea in the *Berger extravagant*. Eleven years later Gomberville published the first draft of *Polycandre* (1632), which he extended in 1634 by the injection of a story of Mexican adventure, and, since this piqued curiosity, he again greatly extended the story in 1637. Meantime Gomberville had aided in founding the Academy. A few years later he fell under the influence of Port-Royal, and, in penitential regret for having amused a worldly generation, he published *Young Alcibiade* (1652). He was a facile polygraph, but *Polycandre*, which in its final shape contains 4409 closely printed pages, is his only significant work. It rejuvenated the interest in the romance of chivalry by transporting it to the New World in a generation whose imagination was intoxicated by strange voyages and undreamed-of conquests. The story is almost wantonly martistic, but Gomberville is the first important pedagogue of fiction, bent on remolding the "perfect lives" of the old romances into a model for the gentlemen of the seventeenth century. He died in Paris, June 14, 1674. Consult Körting, *Geschichte des französischen Romans im XVII. Jahrhundert*, vol. i (2d ed., Oppeln, 1891), and R. Kerviler, *Marin Le Roy de Gomberville* (Paris, 1876).

**GOM'BO**. See HIBISCUS.

**GOMBROON'**. See BENDER ABHAS.

**GOMEL**, gŏ'mêly', or **HOMEL**. A district town of the Russian Province of Mohilev, situated on the Soje, an affluent of the Dnieper, about 113 miles southeast of Mohilev (Map: Russia, D 4). It is the centre of the Russian hop industry, lies on two railway lines, has a number of sugar refineries, paper and oil mills, and a good river trade with Mohilev and Kiev. Pop., 1897, 36,846; 1911 (est.), 47,000, mostly Jews. There was a massacre of Jewish inhabitants in September, 1903.

**GO'MER**. The form of powder chamber generally used in smoothbore guns. It was in the form of the frustum of a cone with a hemispherical end, the base of the cone joining the cylinder of the bore. The name was derived from that of its inventor.

**GO'MER** (Heb.; Ass. Gimirrai, Bab. Gimir, Gk. Κιμμήριοι, *Kimmērioi*, Lat. Cimmerii, Armen. Gamir). An ancient people, probably belonging to the Iranian family of nations. About the beginning of the first millennium B.C. they lived on the northern shores of the Black Sea. Here Homer locates them (*Odys.* xi, 14). In the reign of Sargon II (722-705) they appear in Asia Minor, where they threaten the Kingdom of Urartu (see CHALDIANS), according to letters sent by Sennacherib to Sargon, and the letters of one of his generals. In the reign of Esarhaddon (681-

668) the Cimmerians were forced by the Scythians, who were in league with the Assyrians, farther west. They fell upon Phrygia and put an end to the kingdom of Midas. When attacked by the Cimmerians, Gyges, King of Lydia (680-655), appealed for help to Asurbanipal (668-625), sending to the Assyrian court a couple of Cimmerian prisoners "whose language no interpreter understood." Sardis was besieged by the Cimmerians (c.657 B.C.), and Gyges fell in the battle with them (c.655 B.C.). In the time of Ardys (655-625), who entered into closer relations with Assyria, the Cimmerians were finally crushed in a great battle in Cilicia, near the Mediterranean. Remnants of them survived in Cappadocia, which was called by the Armenians Gamir. In Gen. x. 2, 3, Gomer appears as the son of Japhet (q.v.). Consult: Rogers, *History of Babylonia and Assyria* (New York, 1900-01); Winckler, *Altorientalische Forschungen*, vol. i (Leipzig, 1897); id., *Die Keilinschriften und das Alte Testament* (3d ed., Berlin, 1902); Alfred Jeremias, *Das Alte Testament im Lichte des Alten Orients* (Leipzig, 1906); Ed. Meyer, *Geschichte des Altertums* (3d ed., Stuttgart, 1913).

**GOMERA**, gŏ-mā'ra. One of the Canary Islands, situated 20 miles west of Tenerife, in lat. 28° 6' N. and long. 17° 8' W. (Map: Portugal, F 5). Area, 145 square miles. It is of volcanic origin, like the whole archipelago, and has no good harbors. Its elevations, which in some parts of the interior approach 4000 feet, are well wooded with bay and palm trees. Dromedaries are bred, and the chief industry is cattle raising. Some silk and potatoes are exported. Pop., 1900, 15,358, 1910, 19,736. Chief town, San Sebastián de Gomera: pop., 3187.

**GOMES DE AMORIM**, gŏ'mêsh dâ ä'mô-rên', FRANCISCO (1827-91). A Portuguese poet and dramatist, born at Aveloman (Minho). Born in poverty, he was sent to Brazil early in life, where he was compelled to labor under severe conditions, yet he found time to study the language and customs of the wild peoples in the primeval forests bordering the Amazon and the Xingu. In 1846 he returned to Portugal; in 1848 wrote "Garibaldi," "A liberdade," and other verses in celebration of that revolutionary year, and though at first compelled for support to learn the hatter's trade, he obtained a post in the government service in 1851 and in 1859 was appointed librarian to the Ministry of Marine and curator of the Museum of Naval Antiquities. In his literary career he was much encouraged by Almeida-Garrett (q.v.), whose *Camões* he read in Brazil, and in regard to whom he wrote the appreciative *Memórias biograficas* (1881), which is in fact a history of the literary movement represented by Garrett. The volumes of poems, *Cantos matutinos* (3d ed., 1874) and *Ephemeros* (2d ed., 1866), were followed by a series of dramas—*Ódio de raça*, *A proibição*, *Figados de tigre*, *Os incógnitos do mundo*, *Ohigi*, *A ruiva*, and others—many of which, like *O cedro vermelho* (with a commentary), are derived from Brazilian life. The works of fiction *Os selvagens* (1875), and its sequel, *O remorso vivo* (1876), have the same source. There is a collected edition of Gomes's works in Portuguese (Lisbon, 1866 et seq.), and several of the dramas have been rendered into French by Richon and Denis. Consult Reinhardt-toettner, *Aufsätze und Abhandlungen* (Berlin, 1887).

**GÓMEZ, gō'más, ANTONIO.** See ORSINI, FELICE.

**GÓMEZ, ESTEVAN** (c.1474-c.1530). A Portuguese navigator. In 1519 he started from Spain with Magellan, as pilot on the *Trinidad*, of which vessel Magellan himself acted as captain; but in the Strait of Magellan he commanded a successful mutiny on the *San Antonio*, to which vessel he had been transferred, and, leaving the rest of the fleet, returned to Spain. Sent by Charles V on a voyage to discover a western passage to the Moluccas in 1524-25, he sailed along the coast of North America, between lat. 40° N. and Newfoundland. It is not known whether he sailed from north to south, or vice versa. The results of his voyage were incorporated in the map of Diego Ribeiro (1529), where the eastern portion of the United States is called *Tierra de Estevan Gómez*. Consult HARRISSE, *Discovery of North America* (London, 1892), and BOURNE, *Spain in America* (New York, 1904.)

**GÓMEZ, JOSÉ MIGUEL** (1846- ). A Cuban soldier and politician, born in the Province of Santa Clara. The son of a rich cattle raiser, he spent much of his life in this occupation. He served with distinction in the patriot army during the Ten Years' War (1868-78) and again in the revolution of 1905, rising to the rank of major general. During the First American Intervention he was Governor of the Province of Santa Clara and a member of the Constitutional Convention. He was again Governor of Santa Clara under the presidency of Estrada Palma. In 1905 he was the candidate of the Liberal party for the presidency, but withdrew before the election, claiming that the Conservative (administration) party were using corrupt means to secure the victory. His activity in the revolution of 1906 against the régime of Estrada Palma was cut short by his arrest at the beginning of the movement and his imprisonment in Havana, where he remained until the Second American Intervention began. In 1908 he was elected President by the Liberals, and on Jan. 28, 1909, Governor Magooñ turned over the government to the new President. Laws were immediately passed legalizing cockfights and the lottery and establishing long-distance telephones. There was much extravagance in the administration of finances during his term. Charges of corruption led in 1912 to a revolt, which was crushed, and a year later President Gómez quietly retired from office.

**GÓMEZ, JUAN VICENTE** (1859- ). A Venezuelan politician, born in San Antonio de Tachira. He devoted his early life to agricultural pursuits and entered politics in 1892. Having been elected Vice President, he was left in charge of the government by General Castro when the latter went to Europe in 1908. Learning of a plot for his own assassination, Gómez assumed control of affairs and was chosen provisional President. He at once adjusted the difficulties in which Castro's acts had involved Venezuela with various foreign countries. In 1910 he was elected constitutional President for a term of six years. Consult J. HUMBERT, "Le Président Gómez et la politique Vénézuélienne," in the *Bulletin de la Bibliothèque Américaine* (Paris, 1910).

**GÓMEZ DE AVELLANEDA Y ARTEAGA, gō'máth dá á'vél-yá-ná'thé é ar'tá-á'gá, GERTRUDIS** (1814-73). A Spanish poet, drama-

tist, and novelist, born on the island of Cuba, where her father, a naval officer, was then serving. In 1840 she went to Madrid and in the same year produced a successful drama, *Leoncia*. She wrote many novels, among which are *Dos mujeres* (1842), *Espatolino* (1844), and *El mulato Sab* (1839), this last-named work being a tale resembling *Uncle Tom's Cabin*; but they are mostly forgotten, and she survives as dramatist and poet. In addition to *Leoncia*, she wrote several other dramas, chief of which are *Saúl* (1849), one of the most daring and happy strokes of genius that Spain has seen, and *Baltasar* (1858), a classic drama with a biblical subject and considered by most critics her masterpiece. Her *Poesías líricas* first appeared in 1841, and critics have been unanimous ever since in proclaiming her without a rival of her sex among writers of Castilian in the nineteenth century. Fitzmaurice-Kelly, who is not fond of superlatives in criticism, goes so far as to say that Doña Gertrudis has no superior (with the single exception of Christina Rossetti) among modern poetesses in any language. A single example will show how her work was judged even when it was not known to be hers. At a literary competition held by the Liceo de Madrid in 1845 two prizes were offered for the two odes that should most worthily praise the Queen's clemency in pardoning a certain political criminal. Doña Gertrudis presented two odes—one signed with her own name and the other with that of her maternal half brother, Felipe de Escalada—and won both prizes. The Liceo then voted her a crown of honor, which was placed upon her head by the Infante Francisco de Borbón. Her *Obras literarias*, vols. i-v (Madrid, 1869-71), are still incomplete.

**GÓMEZ-FARÍAS, gō'más-fá-rō'ás, VALENTIN** (1781-1858). A Mexican statesman. He was born and educated at Guadalajara, where he received a professorship in the university in 1810. He was a pronounced Liberal in the First Constituent Congress, became Vice President upon the election of Santa Anna, and assumed the reins of government upon the absence of the latter (April 1, 1833). In consequence of his pronounced antagonism to the Church party, he was, after a constant struggle of two years against continuous opposition, compelled to resign in 1835 and exiled. Although received by the masses with general acclamation upon his return, his political influence aroused the fears of the party in power, and, after suffering imprisonment and vainly endeavoring to foment a revolution, he was again banished. He was again Vice President at the time of the war with the United States, when Santa Anna was compelled to take the field. After the abolition of the vice-presidential office he became a member of Congress. He later took an active part in overthrowing the dictatorship of Santa Anna and became Postmaster-General under his successor Alvarez.

**GÓMEZ Y BÁEZ, gō'más é bá'ás, MÁXIMO** (1826-1905). A Cuban general, born at Bani, Santo Domingo. He served in the Spanish army in Santo Domingo and in Cuba, but in Cuba he became disgusted with Spanish rule. He left the Spanish army, settled down as a planter, and in the insurrection of 1868-78 joined the insurgents and was made colonel by the Cuban President Céspedes. He was active and able and after Agramonte's death was put in command of

the insurgents in Puerto Príncipe. When peace was signed with Campos in 1878, Gómez went to Jamaica and then to Santo Domingo, where he lived on his farm until 1895, when the second revolution broke out. He became general in chief of the forces of the Republic of Cuba and was especially active in Puerto Príncipe, where his perfect familiarity with the country stood him in good stead. He did little open fighting, but accomplished much by harassing the Spaniards and destroying their supplies. He put his small force at the disposal of the Americans as soon as they landed in Cuba and was markedly friendly to this country. In March, 1899, he was deposed from his supreme command by the Cuban Military Assembly for receiving for his army the \$3,000,000 voted by the United States government, but his general popularity remained undiminished, and the city of Havana gave him the summer home of the former Spanish Governor-General. Among his sketches of warfare in Cuba are *Panchito Gómez* and *Mi Escolta* (1896). Consult Carrillo, *In the Saddle with Gómez* (New York, 1898).

**GOMME**, göm, SIR (GEORGE) LAURENCE (1853-1916). An English antiquary and folklorist, born in London. He became statistical officer and later clerk to the London County Council, was the founder of the Folklore Society, an organization that has done important work in the preservation of records of the rural customs of England. Of this society he was elected successively secretary, president, and vice president. He was also appointed a lecturer in the London School of Economics and edited the *Archaeological Review*, the *Folklore Journal*, and the *Antiquary*. In 1911 he was knighted. His publications include: *Primitive Folk-Moors* (1880); *Folklore Relics of Early Village Life* (1883); *The Village Community* (1890); *Ethnology in Folklore* (1892); *Lectures on the Principles of Local Government* (1897); *Folklore as an Historical Science* (1908); *The Making of London* (1912).

**GOMORRAH**. See SODOM AND GOMORRAH.

**GOMPERS**, SAMUEL (1850- ). An American labor leader, born in London, England. Apprenticed to the trade of cigar making, he came to the United States in 1863 and in 1864 became the first registered member of the Cigar-Makers' International Union, of which he was secretary and president, and which he made one of the most successful of American trade unions. He was elected vice president of the American Federation of Labor, which he helped to organize in 1881, and from 1882, with the exception of the year 1894, when he was defeated by John McBride, representing the coal miners, was its president. Under his direction the American Federation of Labor grew into a powerful organization, including most of the stronger and more conservative unions of the country. Its influence in politics has been exerted for the most part indirectly, but has counted in such matters as the extension of the eight-hour day to work on government contracts, the short-hour movement in enterprises of a public-service character, employers' liability laws, etc. In 1908 Gompers sought, without marked success, to throw the strength of the Federation to the Democratic party, on the ground that the Republican candidate was unfriendly to organized labor. He consistently opposed socialistic tendencies in the labor movement and actively promoted industrial concilia-

tion. He served as first vice president of the National Civic Federation. In 1907 Gompers and other officers of the American Federation were enjoined by a Federal court from publishing the name of the Buck Stove and Range Company in the list of "unfair" concerns in the organ of the Federation. In consequence of failure to observe the injunction he was tried for contempt and sentenced to a term in prison. Through successive appeals the case was dragged out until 1914, when the Supreme Court decided that further action was barred by the Statute of Limitations.

**GOMPERZ**, göm'perts, THEODOR (1832-1912). An Austrian classical scholar. He was born at Brünn and studied at Brünn and at the University of Vienna, where he was professor of classical philology from 1869 to 1901, when he entered the House of Peers. He is best known for his decipherment of the papyri at Herculaneum (q.v.). He wrote, besides many other works and articles: *Demosthenes der Staatsmann* (1864); *Philodemus de Ira Liber* (1864); *Herculaneische Studien* (2 vols., 1865-66); *Beiträge zur Kritik und Erklärung griechischen Schriftsteller* (7 vols., 1875-1900); *Die Bruchstücke der griechischen Tragiker und Cöbets neueste kritische Manier* (1878); *Herodoteische Studien* (1883); *Zu Philodems Büchern von der Musik* (1885); *Platonische Aufsätze* (3 vols., 1887-1905); *Griechische Denker, eine Geschichte der antiken Philosophie* (3 vols., 1893-1909; vols. i and ii in a second edition, 1911-12; translated into English by Magnus and Berry, 4 vols., New York, 1905-12). He also edited the German edition of the works of John Stuart Mill (12 vols., 1869-80).

**GOMPHOCERAS**, göm-fös'è-ras (Neo-Lat., from Gk. γόμφος, *gomphos*, nail, bolt + *keras*, *keras*, horn). A genus of tetrabranchiate cephalopods, allied to *Orthoceras*, and found in the Paleozoic rocks, with short, thick, straight, or curved shells, and restricted lobate aperture. The siphuncle is situated near the ventral wall and is usually beaded. The shell, when curved, turns away from the ventral side. *Gomphoceras* presents variations that grade towards *Phragmoceras*, of which it perhaps presents, in a loose sense, an ancestral stage. About 150 species of *Gomphoceras* have been described from rocks of Ordovician and Silurian age of Europe and North America. They are especially abundant in the Silurian basin of Bohemia. See CEPHALOPODA, ORTHOCERAS; NAUTILUS.

**GOMPHO'SIS** (Neo-Lat., from Gk. γόμφωσις, a nailing together, from γόμφω, *gomphō*, to nail, from γόμφος, *gomphos*, nail, bolt). A joint in which one bone is implanted into a process in another bone, as in the case of the teeth, implanted into the alveolar processes of the jaw.

**GOMUTI**, gô-moŭ'ti (Malay), ARENG, or EJOO PALM, also called WINE PALM (*Arenga saccharifera*). An important palm which grows in dry ground in Cochin China and in the interior of Java, Sumatra, Celebes, and Amboyna. The stem is 20 to 40 feet high; the pinnated leaves 15 to 25 feet long. The flowers, which are produced but once, are in bunches 6 to 10 feet long, succeeded by yellowish-brown, three-seeded, extremely acid berries of the size of a small apple. The stem, when young, is entirely covered with sheaths of fallen leaves, and black horsehair-like fibres, which issue in great abundance from their margins; but as the tree increases in age, these drop off, leaving a beauti-



ful naked columnar stem. The strongest of the fibres, resembling porcupine quills in thickness, are used by the Malays as styles for writing on the leaves of other palms. The finer fibres, or Ejóo fibre, well known in Eastern commerce as gomuti, are by far the most valuable. They are much used for making strong cordage, particularly for the cables and standing rigging of ships, European as well as native. Want of pliancy renders them less fit for running rigging and for many other purposes. They need no preparation but spinning or twisting. No ropes of vegetable fibre withstand wet as well as those made of gomuti fibre. At the base of the leaves of the gomuti palm there is a fine woolly material, called bara, much employed in calking ships and stuffing cushions. The saccharine sap, obtained in great abundance by cutting the spadices of the flowers, is evaporated to make a brown sugar, the so-called jagger. It is also a beverage and by fermentation yields an intoxicating wine (neroo), from which a spirituous liquor called brum is made. According to Roxburgh, the pith of the tree yields sago, as much as 150 pounds being taken from a single specimen. After fruiting, the tree dies, and the stems, which become hollow, are used for troughs, spouts, etc. The young fruits are employed for making preserves.

**GONAÍVES**, gô'ná'êv'. A seaport town of Haiti, with an excellent harbor, situated on the west coast, about 67 miles northwest of Port-au-Prince (Map: West Indies, D 3). It is a prosperous place, with a large trade in cotton, coffee, and logwood. It has played a prominent part in the history of Haiti; Dessalines proclaimed the independence of the country here (Jan. 1, 1804). In 1914 two important battles were fought here between the rebels and the government forces. Its population is estimated at 13,000. Gonaíves is the seat of a United States consul.

**GONAQUAS**, gô-ná'kwáz. A mixed Hottentot-Kaffir people of Cape Colony. See GRIQUAS.

**GONÇALVES DIAS**, gôn-sál'vôsh dé'ash, ANTONIO (1823-64). A Brazilian poet, born in Maranhão. He was educated at the University of Coimbra, Portugal, but, returning to Brazil in 1846, there published his first volume of poems, *Primeiros cantos*, which won him immediate fame. Two years later his *Segundos cantos* appeared. In 1849 he was chosen to fill the newly created chair of Brazilian history in the Imperial College of Pedro II. The publication in 1851 of his *Últimos cantos* practically closed his poetical activity, for in that year he was appointed to investigate educational conditions in northern Brazil. In 1852 he was sent to Portugal to collect from the archives there documents relating to Brazilian history, and in 1860 he was a member of a scientific expedition to Ceará to report on history and ethnography. His last years were spent in Europe in declining health, and he died at sea during a storm which sank the ship and with it his remains and the results of his last three years' labors. Possessing the blood of the three races of Brazil, he represents that which is most national in her poetry, besides being the bard of the Indians. His writings include history, drama, and lyric poetry, in the latter of which he ranks first in Brazil. Besides his *Cantos*, his writings include the epic *Os Tymbiras* (1857), *Diccionario da lingua Tupy* (1858), *Historia dos Jesuitas de*

*America* (incomplete), and numerous reports on his special commissions. Consult his *Obras posthumas . . . precedida de uma noticia de sua vida e obras pelo Dr. A. Henriques Leal* (Maranhão, 1868), and Verissimo, *Estudos de literatura brasileira, segunda serie* (Rio de Janeiro, 1901).

**GONCHAROV**, gôn'chá-rôf', IVAN ALEXANDROVITCH (1812-91). A great Russian novelist. He was born at Simbirsk, of a very wealthy family. At 10 he was sent to school at Moscow, whence he went to visit his home only during vacations. Completing his university course in 1836, he accepted a position in the Ministry of Finance. His literary career began with *A Common Story* (1847), which had a great success. In 1856-57 he published the *Frigate Pallas*, a collection of letters describing his voyage around the world, made in the frigate *Pallada*. These letters constitute one of the choicest works of the kind in Russian literature. In 1858 he wrote the novel *Oblomov* and a little later was appointed to a position in the Department of Censorship. Then he became editor of the official organ, the *North-east Post*, and retired with a pension in 1873. In 1868 his *Precipice* appeared in the *Messenger of Europe* and greatly aroused the public and critics by the caricature of Young Russia in the dissolute Volokhov. His later short sketches and critical essays, the most striking of which is *A Million Tortures*—a powerful analysis of *The Woes of Wit* by Griboedov (q.v.)—added little to the fame of the author of *Oblomov*, a masterpiece which ranks with the best novels of Tolstoy and Turgenev (qq.v.). The diseased will and chronic indolence which its hero, Oblomov, typifies have given Russia the term "Oblomovism." The power of generalization reached here by the author has never been surpassed in Russian literature. The best complete edition of his works was published at St. Petersburg in 1886-87. Consult: Merezhkovsky, *Dostoyevsky, Goncharov, Maikov* (St. Petersburg, 1908); Vengerov, *Drushnik, Goncharov, Piskunsky* (ib., 1911); Liatsky, *Goncharov: His Life, Personality, and Work* (ib., 1912). In English a good brief study may be found in Kropotkin's *Russian Literature* (New York, 1905).

**GONCOURT**, gôn'kôor', EDMOND DE (1822-96) and JULES DE (1830-70). Brothers, important in the development of French fiction. They fostered naturalism by the minuteness of their observation and so continued the naturalistic method of Flaubert and regarded themselves as masters of a school in which Zola was the most brilliant pupil; while, on the other hand, in the tortured artificiality of their style they presage the painful striving of the Symbolists (q.v.) to express feeling and emotion by sound. Their intensely modern style, often bizarre, sometimes intentionally faulty, always achieving its effect, made all their contemporary novelists in some degree their debtors, while it estranged the general public. Their work consists of unimportant dramas, of minute and valuable studies in the social life of the French eighteenth century: *Histoire de la société française pendant la révolution* (1854); *Histoire de la société française pendant le directoire* (1855); *La révolution dans les mœurs* (1854); *Portraits intimes du XVIIIème siècle* (1856-58); *Marie Antoinette* (1858); *Les maîtresses de Louis XV* (1860-79); *La femme au XVIIIème siècle* (1862); *L'Art au XVIIIème siècle* (1874); *L'Amour au XVIIIème*



*siècle* (1877); to which Edmond added historical studies of *Watteau* (1878), *Prud'hon* (1877), and *Les actrices au XVIIIème siècle* (1855-90); of articles that first directed French attention to Japanese art; and, finally, of novels: *Charles Demailly* (1860); *Sœur Philomène* (1861); *Renée Mauperin* (1864); *Germinie Lacerteux* (1865); *Manette Salomon* (1867); *Madame Gervassais* (1869); to which Edmond added: *La fille Elisa* (1878); *Les frères Zemganno* (1879); *La Faustin* (1882); *Chérie* (1884). All these are minutely realistic, composed of facts and observations strung together without much regard for unity of composition. Their observation, however, for all its minuteness is apt to be superficial and morbid. *Germinie Lacerteux* is to be "the clinic of love," and *La fille Elisa* pushes to its utmost paradox the divorce between fiction and conventionality, though in *Renée Mauperin* they succeeded in giving a most characteristic portrayal of the young Parisian society girl. Their ability to reproduce a series of sensations by a series of images is what most attracts. Edmond left the larger part of his fortune to endow an Academy of the Goncourts. This was first organized in 1904 with 10 members, each to receive an annual income of 6000 francs. Every year a prize of 10,000 francs is awarded to the author of a meritorious work in prose. Among the members named by Goncourt in his will were Alphonse Daudet, Léon Hennique, J. K. Huysmans, Paul Margueritte, and the Rosny brothers. Their *Journal* (1887-96) is a most valuable document on the literary movement of their period. Consult: Delzant, *Les Goncourts* (Paris, 1889); Brunetière, *Le roman naturaliste* (ib., 1896); Wells, *A Century of French Fiction* (New York, 1898); Gustave Abel, "Le labeur des de Goncourt," in *Mélanges de Philologie* (Paris, 1901); M. Fuchs, *Léonique du Journal des de Goncourt* (ib., 1912).

**GONDAR**, or **GUENDAR**. The former capital of Abyssinia, in Amhara, situated about 25 miles north of Lake Tsana (Map: Egypt, D 5). It lies on an isolated hill in a spur of the Wogara Mountains, at an altitude of over 6000 feet. It is poorly built, with crooked, narrow streets, and is divided into several parts, which are located at some distance from each other. In former times Gondar had a large number of churches, of which only one is now in perfect preservation. Near by is the ruined fort of Gip, constructed by the Portuguese. The palace is a fine example of Abyssinian architecture. The inhabitants, once estimated at 50,000, now number about 7000, including many monks and other ecclesiastics. Gondar is on the route of the partly constructed railway line from Massawa (q.v.). There are many skilled artisans here, who produce gold ornaments and textiles. Gondar is the seat of the abuna, the head of the Abyssinian church, and has several ecclesiastical schools. Its decline dates from the reign of Theodore II, whose hostile attitude towards the Mohammedans caused a great decrease in the population. Of late years Gondar has shown signs of returning prosperity, and the Mohammedan population is rapidly on the increase. Consult P. H. G. Powell-Cotton, *A Sporting Trip through Abyssinia* (London, 1902).

**GONDI**, or **GONDY**, gôn'dé', JEAN FRANÇOIS PAUL DE. See RETZ.

**GONDIBERT**. A religious epic in elegiac stanzas by Sir William Davenant, begun late in 1649, in Paris, and finished during imprison-

ment in the London Tower. It was published in 1651.

**GONDOKORO**, gôn-dók'ô-rô, or **ISMAILIA**, ez'mâ-é'lé-â. A small settlement in Uganda, capital of the northern province of that protectorate, 1070 miles south of Khartum, situated on the upper Nile, in lat. 4° 55' N. (Map: Egypt, C 6). It was formerly an important trading centre for ivory and slaves. Its commerce began to decline after its annexation to Egypt in 1871, though it is still important commercially as the head of the navigation of the Nile and is the outlet for much of the produce of northern Uganda. It is also a military post of some distinction. Gondokoro figures prominently in the history of the explorations of Africa.

**GONDOLA** (It.). The ordinary passenger boat used in the canals of Venice. Gondolas were formerly the only means of getting about the city, but they are now being displaced in part by small launches. An ordinary gondola is 30 feet long and 4 or 5 feet wide and is flat-bottomed, so that the draft is light. The bottom rises slightly above water at the ends, while at the bow and stern slender ornamental stem and stern pieces reach to about the height of a man's breast. The stern piece is surmounted by the *ferro*, a bright iron beak of uniform shape, the *rostrisque tridentibus* of Vergil, common to old Roman galleys. There is a covered shelter for passengers in the middle of the boat, which is easily removable. In accordance with a mediæval regulation, gondolas are painted black. The gondolier stands erect, with his face towards the bow, and propels the boat with a forward stroke, making his way through the narrow and often crowded canals with amazing dexterity.

**GONDS**. An important Dravidian people, inhabiting mainly the Central Provinces of India, but found also in other sections of the country, and numbering about 1,500,000. The wilder and uncivilized tribes of the Gonds, who inhabit the forested hills of the Vindhya and Satpura ranges, preserve more of the primitive Dravidian physical type, social institutions, religious and mythological beliefs and practices than do those whose culture is more advanced, who have to a considerable extent adopted Hinduism, and with whom the higher classes are more or less mixed with Hindu blood. The Gonds are said to have formerly offered up human sacrifices to some of their deities, but now they sacrifice instead an image of straw. The Gond women have a curious festival, called the Gurtarna (sugar breaking), in which the men figure to some disadvantage. It often ends in a saturnalia. Among the Gonds the worship of such plagues as smallpox, cholera, etc., prevails, and many of them reverence the dog, the horse, and the tiger to an extraordinary degree. The Gonds are to a large extent monogamous and have many curious marriage and premarital customs. The Gonds are not to be confounded with the Khonds, another Dravidian people to the east of them. Besides the earlier works of Campbell, *Wild Tribes of Khondistan* (London, 1863), and Hislop, *Aboriginal Tribes of the Central Provinces* (Nagpur, 1866), reference may be made to Forsyth, *Highlands of Central India* (3d ed., London, 1889); V. A. Smith, *The Early History of India* (ib., 1908); T. W. Holderness, *Peoples and Problems of India* (New York, 1912).

**GONDWANA**, gûnd-wâ'nâ (the land of the

Gonds) (q.v.). A name vaguely applied to a hilly tract in Central India, lying between lat. 18° and 24° 30' N. Most of the region is included in the Central Provinces.

**GONERIL.** The more wolfish of the unnatural daughters of King Lear, in Shakespeare's tragedy of that name.

**GONFALON** (archaic *gonfanon*, OF. *gonfanon*, Fr. *gonfalon*, from ML. *gonfano*, *guntfano*, banner, from OHG. *gundfano*, battle flag, from *gund*, battle + *fano*, *vano*, Ger. *Fahne*, flag). The ensign or standard, indicative of authority, which was carried before, and sometimes by, the chief magistrate (hence called *gonfaloniere*) of many of the Italian cities in the latter part of the Middle Ages. The title was also used by the counts of Vexin, and when Vexin passed to the crown the French King became the "Gonfalonier de S. Denis."

**GONG.** See TAM-TAM.

**GÓNGORA Y ARGOTE**, gón'gó-rá é ár-gó'tá, LUIS DE (1561-1627). A Spanish poet, born at Cordova. He studied law at the University of Salamanca and there composed the greater part of his erotic poems, romances, and satires. At the age of 45 he took orders, obtained a small prebend in the cathedral of Cordova, and was afterward appointed honorary chaplain to Philip III. Góngora's poetic career divides itself into two periods. In his first or youthful period he yielded himself up entirely to the natural tendencies of his genius and to the spirit of the nation. His lyrics of this period are *villancicos*, *letrillas*, romances, and sonnets in the old genuine Spanish style, and, as regards their caustic satire and burlesque wit, are among the most admirable specimens of the class of poems to which they belong. Góngora, however, wished to outdo all his predecessors and to furnish something wholly new and unheard of; and the result of this unfortunate ambition was the introduction of a new poetic phraseology, called the *estilo culto*, or the 'cultivated style.' From this point the second period in Góngora's literary career dates. To popularize the *estilo culto*, he wrote his *Polifemo*, *Soledades*, and the *Piramo y Tisbe*—productions of the most pedantic and tasteless description, poor in invention and thought, but rich in high-sounding, pompous phrases, and overloaded with absurd imagery and mythological allusions, expressed in language of studied obscurity. In this way he became the founder of a new school, the *Gongoristas*, or *Culteranos*, who even surpassed their master in the depravity of their literary tastes. The baneful influence of Gongorism, a style quite like that of Euphuism in England and that of Marinism in Italy and France, continued down through the eighteenth century. None of Góngora's poems were printed during his lifetime; but in 1627, immediately after his death, they were published at Madrid by his friend Vicuña, as the *Obras en verso del Homero Español*. Some additions are found in the later editions of 1633, 1654, and 1659, as well as in the edition of 1636-49, for which Salcedo Coronel prepared a commentary, made necessary by the studied obscurity of Góngora's style. He died at Cordova. A critical edition of the poet's work is still a desideratum.

**Bibliography.** Quintana, *Poesías selectas*, vol. iii (Madrid, 1807); Churton, *Góngora: An Historical and Critical Essay, with Translations* (London, 1862); *Poesías escogidas de Góngora, con varias inéditas* (Madrid, 1863); *Revue His-*

*panique*, vol. iv (Paris, 1897), containing 49 unedited poems published by Rennert; Foulché-Delbosc, "Note sur trois manuscrits des œuvres poétiques de Góngora," in *Revue Hispanique*, vol. vii (1900), "Vingt-six lettres de Góngora," ib., vol. x (1903), "Poesías atribuidas à Góngora," ib., vol. xiv (1906), "Bibliografía de Góngora," ib., vol. xviii (1908); Thomas, *Góngora et le gongorisme considérés dans leur rapports avec le marinisme* (Paris, 1911); *Biblioteca de autores españoles*, vol. xxxii (Madrid, 1849-80), unsatisfactory as to text.

**GONIATITES**, gō'nī-ā-tī'tēz (Neo-Lat., for \**Gonialites*, from Gk. γωνία, *gōnia*, angle + λίθος, *lithos*, stone, in allusion to the angulate sutures). An extinct tetrabranchiate cephalopod, the shell of which resembles that of the *Ammonoidea* in form, but differs from it in having a simple suture line that shows undulating or zigzag curves without secondary crimping. The *Goniatites* have smooth unornamented shells of discoid or globular form, with open or closed umbilicus. They vary in size from 1 to 4 inches, though some species from the Devonian system attain a diameter of over 12 inches. The name "*Goniatites*" has long been used in a generic sense; but the group has proved to be heterogeneous, and the species have been redistributed among a number of new genera and four new suborders, the *Microcampyli*, *Mesocampyli*, *Eurycampyli*, and *Glossocampyli*, these names referring to the form of the saddles of the sutures in the types of the different groups. The old genus *Goniatites* was considered to be an intermediate form between the *Nautiloidea* and the *Ammonoidea*, and the above-mentioned suborders represent, in a broad way, transition groups between certain races of nautiloids and certain races of ammonoids.

The species of *Goniatites* appear first in the lowest Devonian rocks, and they disappear in the Triassic system; their period of maximum development was during Upper Devonian and Lower Carboniferous time. They are thus index fossils of the Upper Paleozoic age. They are found in Europe, Asia, Australia, and North America, often in such abundance that the beds containing them have received the names of Clymerien-kalk and *Goniatites* limestone. See *AMMONOIDEA* and *CEPHALOPODA*, and the bibliography given under the latter title.

**GONIDIA** (Neo-Lat. nom. pl., from Gk. γωνή, *gonē*, seed). The algal cells of a lichen. Also applied by some botanists to the asexual spores of algae and fungi and including the well-known conidia of those groups. See *LICHEN*.

**GONIO CERAS**, gō'nī-ōs'ēr-ās. A widely aberrant genus of nautiloid cephalopoda, characterized by its flat triangular shape, with broad lateral wings, recurving septa, and moniliform siphuncle. It is best known by *Goniceras anceps* from the Ordovician limestones of New York and Canada, but has been found in the far north of America and in China, apparently having been restricted to the Pacific and Arctic oceans and their continental invasions. See *CEPHALOPODA*; *NAUTILUS*.

**GONIOMETER** (from Gk. γωνία, *gōnia*, angle + μέτρον, *metron*, measure). In mineralogy, an instrument used to measure the angles of crystals. The simplest form is the contact goniometer, which consists of a pair of arms which move about a pivot like a pair of shears and can be clamped in any position and connected with a protractor for the reading of

angles. The *reflecting goniometer* makes use of a beam of light reflected successively into a telescope from different faces of a crystal as the crystal is revolved upon a single axis. The direct readings of this instrument give by their numerical difference the supplement of the angle desired. The most modern type of goniometer is constructed on the principle of the theodolite and measures angles in two planes at right angles to each other. This is known as the *theodolite goniometer*, or *two-circle goniometer*, and its introduction has not only extended the possibilities of measurement, but greatly simplified the calculation of crystal forms. See CRYSTALLOGRAPHY.

**GONIOMETRY.** A branch of trigonometry concerned with the functions of angles in general and with their relations. The word signifies "angle measure." See TRIGONOMETRY; GONIOMETER.

**GÖNNER**, gën'nër, NIKOLAUS THADDÄUS VON (1764-1827). A German jurist, statesman, and author. He was born at Bamberg, where he was appointed to the chair of law (1789). Ten years afterward he accepted a similar position at Ingolstadt, where he exercised a most beneficial influence upon the development of the university, which by his suggestion was subsequently removed to Landshut. From 1811 until shortly before his death he held many judiciary offices at Munich, where he was appointed Councilor of State in 1820. His principal works include *Handbuch des deutschen gemeinen Processes* (2d ed., 4 vols., 1804) and *Deutsches Staatsrecht* (1804).

**GO'NOCOC'US.** See GONORRHEA.

**GONORRHEA**, gôn'o-rë'a (Lat., from Gk. γονόρροια, *gonorrhōia*, from γόνος, *gonos*, semen + ροία, *rhoia*, a flow, from ρέω, *rhein*, to flow). A name which was formerly applied almost indiscriminately to all discharges from the genital passages in both sexes. At present the name designates a specific inflammatory disease of the mucous membrane of the urethra, caused by a germ, the gonococcus, which was discovered by Neisser. The disease is never caused by "taking cold," or a "strain," by mere uncleanness or injury. The access to the urethra of mucus or pus containing the gonococcus occurs, in the vast majority of cases, during sexual intercourse. From 2 to 10 days after the sexual intercourse a slight watery discharge appears at the mouth of the urethra, the lips of which become red and swollen. The discharge quickly becomes abundant and white, later yellowish, possibly greenish or bloody. Itching follows, with burning pain, especially on urination, which becomes frequent. In the male painful erections of the penis occur, principally at night, during which the organ is curved. This condition is called *chordee*. Disease of deeper parts often follows an acute attack, and the prostate gland, seminal-vesicles, and neighboring lymphatics become infected. General infection is frequently followed by "gonorrhœal rheumatism," which is an arthritis, or joint disease, with stiffness and pain, caused by the toxins which are formed by the disease germs. It is extremely difficult to treat the disease when it invades the prostate gland or the seminal vesicles. In a woman the vagina, bladder, uterus, Fallopian tubes, and ovaries may be attacked. In many cases acute symptoms are absent or slight, and the patient may not know she has the disease till uterus and tubes are attacked.

From three to five days after contracting the disease most patients suffer from fever, headache, slight nausea, possibly preceded by a chill. During this stage the patient should be in bed, on low diet, and should take a cathartic and drink large quantities of plain water. Injections taken too early or in too concentrated a form may drive the infected mucus deeper, or injure the urethra. Injections of solutions of protargol, argyrol, nitrate of silver, permanganate of potash, sulphate of zinc, etc., are prescribed. Irrigations with bichloride of mercury are sometimes used. Internally cubebs, copaiba, salol, oil of sandal, saw palmetto, and many other drugs are given. When the infection is deep-seated or when the joints are involved, vaccines are frequently curative. All alcoholic beverages must be absolutely prohibited, and all sexual intercourse positively stopped, till two weeks after the patient is cured. The disease is not at an end when the discharge stops, unless the urine is perfectly clear, and the mucus from the prostate gland as well as the seminal fluid contains no gonococci discoverable by the microscope. Infection of a wife may occur when there is no discharge from the disease if the germs lurk in the seminal vesicles. Extreme care should be taken by one suffering with gonorrhœa to catch the discharge in gauze, which should be burned. If the fingers be soiled with the discharge, the eyes may become infected, and blindness may result. The testicles should be supported by a snug suspensory bandage. Patent medicines should be shunned. If gonorrhœa persists for a considerable time and the discharge becomes thin and scanty, the term "gleet" is applied to it.

The *Gonococcus*, or *Micrococcus gonorrhœæ* is an extremely minute organism. It occurs in pairs, with flattened sides lying in apposition. For this reason it is often referred to as the *Diplococcus gonorrhœæ*. It grows readily on human blood serum, with or without agar, at the temperature of the body, not on the more common media. The mucous membranes of the lower animals do not seem susceptible to gonorrhœal infection, but the human urethra reacts promptly to inoculation with pure cultures. In the mucous membrane it sets up an exudative inflammation and may be found either free in the exudate or inclosed in the cast-off epithelial cells. Its presence within the cell bodies, taken in connection with its occurrence in pairs, and its behavior when subjected to a special stain known as Gram's stain, complete its identification. Quite frequently the pus-producing organisms are associated with the gonococcus. It is believed that gonorrhœal infection from the vagina of the mother during parturition is responsible for *ophthalmia neonatorum*, a severe form of conjunctivitis which often results in blindness through the destruction of one or both eyes.

**GONORRHEAL OPHTHALMIA.** See CONJUNCTIVITIS.

**GONSALVO DE CÓRDOBA**, gón-sál'vó dá kór'dô-bá (GONZALO HERNÁNDEZ Y AGUILAR). A celebrated Spanish commander. He was born at Montilla, near Cordova, in 1453 (according to some in 1443). He distinguished himself in the war waged by Queen Isabella of Castile against Portugal and in the war against the Moors and was charged in 1491 with the conduct of the negotiations for the surrender of

Granada. In 1495 he was sent by Ferdinand of Aragon to the assistance of Ferdinand, King of Naples, against the French. In less than a year Gonsalvo, with his limited resources, had delivered the greater part of the kingdom and obtained the appellation of *El Gran Capitán*. In 1498 he returned to Spain and was received with signal marks of distinction by the King. Having been placed in command of a fleet in the Mediterranean, he took Cephalonia from the Turks at the beginning of 1501 and restored it to Venice. When the partition of the Kingdom of Naples was determined upon by a compact between Louis XII of France and Ferdinand the Catholic, entered into at Granada in 1500, Gonsalvo de Córdoba led the invading Spanish army. The conquest of the kingdom was speedily achieved, but the conquerors soon quarreled over the partition of the booty, and war broke out between them in 1502. Gonsalvo de Córdoba vanquished the French at Cerignola, April 28, 1503, took possession of Calabria, the Abruzzi, Apulia, and the city of Naples itself, and then laid siege to Gaeta, but was compelled to retreat before a superior force of the enemy. On December 27 of the same year, however, he fell upon them unexpectedly near the Garigliano and obtained a complete victory. The French army was almost annihilated, the fortress of Gaeta fell, and the possession of Naples was secured to the Spaniards. King Ferdinand bestowed the Duchy of Sesia upon the conqueror and appointed him Viceroy of Naples with unlimited authority. His good fortune, however, made him many powerful enemies, and his popularity with the Neapolitans awoke the King's jealousy. Gonsalvo was recalled to Spain, where the King treated him with marked neglect. He now betook himself to his estates in Granada; but after the defeat of the new Viceroy in Naples by Gaston de Foix, he was again appointed to the command of the Spanish army in Italy. Mental suffering, however, had undermined his health, and on Dec. 2, 1515, he died at Granada. Consult Quintana, *Vida de españoles célebres* (Madrid, 1807), and Prescott, *Ferdinand and Isabella* (Philadelphia, 1864).

**GONTARD**, gôn'tärt, KARL VON (1731-91). A German architect, born at Mannheim. He studied under Richter at Bayreuth and François Blondel at Paris. In 1765 he entered the service of Frederick the Great, with whom he became a favorite, and who intrusted him with several architectural commissions. His structures include two tower-like domes erected on previously existing churches on the Gendarmenmarkt, Berlin; the colonnades of several fine bridges at Berlin; and the marble palace at Potsdam, completed by Langhans.

**GONTAULT**, gôn'tô', CHARLES DE. See BIRON, CHARLES DE GONTAULT, DUC DE.

**GONTAUT-BIRON**, gôn'tô'-bê'ron', A. L. DE. See LAUZON, DUC DE.

**GONVILLE AND CAIUS** (kêz) COLLEGE. A college of Cambridge University, which is usually called Caius College. It was founded in 1348 by Edmund Gonville, sometime vicar-general of the diocese of Ely; but the sudden death of the founder and the insufficient provision for support of the scholars led Gonville's executor, William Bateman, Bishop of Norwich, to remodel the statutes, rechristen the house as the College of the Annunciation, and divert the students to the special

study of theology and canon and civil law. Soon after, the college was moved from its original site to the place it now occupies. It was then of little importance and seems to have consisted only of a master and three or four fellows. In 1558 Dr. John Caius, who was physician to the court, refounded the college, altering the name to its present form; added much to the college buildings as well as to the endowment; and became master of the college, which office he held till his death in 1573. Owing to his influence, the college has since been famous for its attention to medical studies, and some of the greatest of English physicians have been among its members, of whom Harvey, the discoverer of the method of the circulation of the blood, is the most distinguished. Gonville and Caius College consists of a master and 29 fellows. It has 36 scholarships and exhibitions, besides several studentships in medicine and natural science. Among its great names are those of Sir Thomas Gresham, Jan Gruter, Jeremy Taylor, and Lord Chancellor Thurlow. Consult J. Venn, *Caius College* (London, 1901).

**GONZAGA**, gôn-zî'gà, HOUSE OF. A princely Italian family whose members for a number of centuries ruled over Mantua and Monterrat. It claimed descent from the German Emperor Lothair. The rule of the Gonzaga in Mantua was established in 1328 by the final defeat of the Bonacolsi family and the murder of their chief, Passerino de' Bonacolsi, by his brother-in-law Luigi I. In 1432 the captaincy was changed to a marquisate and in 1530 to a dukedom. In 1536 the Gonzaga became marquises of Monterrat, in 1539 they acquired the Duchy of Guastalla, and in 1565 that of Nevers. Other important possessions of the family at various times were the duchies of Solferino, Rethel, and Sabbionetta, the Principality of Bozzolo, the Marquisate of Medola, the countships of Torelli and Novellara, and the Principality of Castiglione. The members of the house of Gonzaga were the faithful champions of Imperial interests in Italy and waged war with the Visconti, dukes of Milan. They produced many men who became famous soldiers, statesmen, churchmen, and patrons of art and letters. The most illustrious of these were: GIOVANNI FRANCESCO (died 1444), in whose favor Mantua was created a marquisate by the Emperor Sigismund, in return for services to the Empire.—GIOVANNI FRANCESCO II (reigned 1484-1519), who was defeated by Charles VIII of France at the battle of Fornovo, on the banks of the Taro, in 1495, and who took part in the engagement of Atella (1496), which led to the capitulation of the French forces in Naples. His son, FEDERIGO II (reigned 1519-40), was invested by the Emperor Charles V with the ducal dignity in 1530 and also obtained the Marquisate of Monterrat in 1536. During the reign of this prince the court of Mantua was one of the most magnificent in Europe.—GUGLIELMO (1550-87), son of Federigo, proved a wise and enlightened ruler; his secretary was Bernardo Tasso, father of the poet.—VICENZO (1587-1612), son of Guglielmo, was the warm friend and patron of Tasso. His brother LUIGI (1568-91) was a Jesuit scholastic, and died while attending those stricken of the plague in Rome. He was canonized as St. Aloysius in 1726 and is the patron saint of students. Vicenzo was followed by his three sons, FRAN-

CESCO, FERDINAND, and VICENZO, all of whom died without heirs, and thus the direct line of the ducal branch became extinct in 1627. A collateral branch in the person of Charles I, Duke of Nevers, son of Ludovico, the brother of Guglielmo, mentioned above, claimed the duchy, which was contested by his cousin, CESARE, Duke of Guastalla. This family feud led to a war, in which France supported Nevers, while the Emperor Ferdinand II claimed the right of adjudging Mantua, as an Imperial fief, to a candidate of his choice. Spain supported Austria in this War of the Mantuan Succession. Mantua was stormed, sacked, and stripped of all its treasures by the Imperialists in 1630 and never regained its former splendor. The war was terminated a few months later, CHARLES DE NEVERS being recognized by the Emperor. The successors of Charles were weak and dissipated rulers, and the tenth and last Duke of Mantua, Charles IV, was the worst of all. As he had allied himself with the French in the War of the Spanish Succession, the Emperor Joseph I placed him under the ban of the Empire, and he was deprived of his possessions, the Duke of Savoy seizing Montferrat, and Austria taking Mantua and the minor fiefs. This division was confirmed by the treaty of peace that followed. Charles died in exile in 1708, leaving no issue, and the family became extinct, save for the branch which ruled Guastalla until 1746. Consult: Symonds, *The Renaissance in Italy* (7 vols., London, 1897-98); E. Solari, *Ercolo Gonzaga* (Venice, 1904); C. Hare, *A Princess of the Reformation: Giulia Gonzaga, her Family and Friends* (New York, 1912).

**GONZAGA**, gôn-zä'gä, THOMAZ ANTONIO (1744-1807). A Portuguese poet, born at Oporto. He studied law in the University of Coimbra, receiving his degree in 1763. In 1768 he went to Brazil, and, after having acted for some years as local magistrate at Beja and elsewhere, he was appointed judge at Villa Rica in the Province of Minas. Before this time he developed some talent for versification, and his literary tastes soon brought him into intimate association with Claudio Manoel da Costa, Alvarengo Peixoto, and other writers of the so-called Minas school; but the love which inspires the poet did not come upon him until he had made the acquaintance (c.1788) of Dona Maria Joaquina Dorothea de Seixas, the *Marilia* of his masterpiece, the *Marilia de Dirceu* (the latter being the name adopted by the poet himself). These verses form the most remarkable collection of erotic poetry, dedicated to a single person, ever written in Portuguese. Gonzaga had just been nominated a member of the Supreme Court of Bahia and was on the eve of his marriage when discovery was made of the treasonable plot of Minas, and he was arrested on suspicion of having been implicated in it. On inconclusive circumstantial evidence he was condemned (1792) to banishment for life to Pedras de Angoche, a sentence which was afterward commuted to one of 10 years' exile at Mozambique. Here he made some effort to practice as an advocate, but he never recovered from the depression with which his cruel lot had affected him. He was attacked by nervous fever, which undermined his health, and after years of increasing melancholy, which occasionally alternated with fits of acute mania, he died. His poems are still favorites with the

Portuguese-speaking peoples, chiefly because of the charm of their style, their melody, and their refined sentiment. Some 29 editions of the *Marilia de Dirceu* appeared before 1854. The best edition is that published in 1862 at Paris. There are biographies prefixed to the editions of Rio de Janeiro (1845 and 1862).

**GONZALES**, gôn-za'léz. A city and county seat of Gonzales Co., Tex., 76 miles east of San Antonio, on the Galveston, Harrisburg, and San Antonio, and the San Antonio and Aransas Pass railroads, and on the Guadalupe River (Map: Texas, D 5). Cotton, cottonseed oil, brick, and tiles are produced. Gonzales was the scene of the first battle in the struggle for Texan independence from Mexico (see TEXAS). Pop., 1910, 3139.

**GONZÁLEZ**, gôn-sá'lés, MANUEL (1833-93). President of Mexico from 1880 to 1884, born near Matamoros, Tamaulipas, Mexico. He attained prominence as reactionary leader under Marcelino Cobos. In the succeeding civil wars he received a wound in action which resulted in the loss of an arm. Under Juárez he fought brilliantly during the French invasion, was promoted brigadier general for bravery in 1867, and after the fall of the city of Mexico was appointed by Juárez governor of the government palace. In 1871 he was arrested on a charge of complicity in the stealing of the gold and silver plate that had belonged to Maximilian, but in the revolution of the same year escaped and joined Díaz. He took part in the third rebellion of Díaz in 1876, distinguished himself in the decisive battle of Teocac, and in 1878 was appointed by Díaz Secretary of War. In 1880 he resigned his portfolio to become a candidate for the presidency, to which office he was elected. His administration was marked by financial mismanagement and disaster. His attempt to compromise the English debt, and his decree suppressing the liberty of the press, aroused such opposition that he resigned in 1884, in favor of Díaz. A resolution of impeachment for misappropriation of funds was introduced in the national Congress, but was not pressed, and he afterward successfully administered the affairs of the State of Guanajuato, of which Díaz appointed him Governor.

**GONZÁLEZ CARVAJAL**, gôn-thá'láth kár'-vá-il', or **CARBAJAL**, kár'-ná-hál', TOMÁS JOSÉ (1753-1834). A Spanish poet and statesman. He was educated in Seville, where he studied theology and jurisprudence and became a noted Hellenist and Latinist. After holding, in the Treasury Department and elsewhere, a number of offices of importance, and refusing to swear allegiance to Joseph Bonaparte as King of Spain, he was obliged to flee in disguise from Madrid to Seville in January, 1809. In March, 1813, he was made Secretary of State and Secretary of the Treasury Department, but resigned both positions in August of the same year in order to become director of the Estudios Reales de San Isidro, where, by establishing a chair of international law and by his liberal ideas, he offended the government and was imprisoned for five years. He was reinstated by the revolution of 1820 and became Councilor of State, but was forced into exile by the counterrevolution three years later. After 1829 he became successively Minister of the Supreme Council of War, member of the Royal Council of Spain and the Indies, and Knight Grand Cross of the Order of Isabella the Catholic. Carvajal was the author

of metrical translations of the poetical books of the Bible and of other works in prose and verse, which earned for him membership in the Real Academia Española and in the Real Academia de la Historia; and his name figures in the *Catálogo de autoridades de la lengua* published by the Spanish Academy.

**GONZÁLEZ DÁVILA**, dā'vé-lā, or **DE ÁVILA**, GIL (c.1578-1658). A Spanish historiographer, born at Avila. He held a minor ecclesiastical office at Salamanca and was appointed royal chronicler of Castile (1612) and the Indies (1641). His *Teatro eclesiástico de la primitiva iglesia de las Indias Occidentales* (1645-55) holds a high place as a general Church history of New Spain. The same may be said, for Spain, of his *Teatro eclesiástico de las ciudades é iglesias catedrales de España* (Salamanca, 1618) and of his *Teatro eclesiástico de las iglesias de España* (2 vols., Madrid, 1649-56).

**GONZÁLEZ NAVEIRO**, EMILIANO (1861- ). A Paraguayan politician. He was educated at the University of Asunción. In 1887 he was appointed criminal judge and later a member of the Superior Court. Entering politics, he was elected senator by the Liberal party. In 1905 he was made Minister of Finance in the cabinet of President Ferreira. The next year he was chosen Vice President and in 1908 succeeded to the presidency. He called the most distinguished men of the country to his aid and endeavored to foster better relations with the rest of Latin America.

**GONZALO DE BERCEO**, gôn-thā'lo dā bār-thā'ô (?1180-?1247). The earliest Castilian poet whose name we know with certainty. Born at Berceo (Old Castile), he became a secular priest in the Benedictine monastery of San Millán de la Cogolla. He became deacon in 1221 and priest in 1237. He appears as a witness in an Act of 1246, which is the last certain date we possess for his life. In addition to the 13,000 verses (written in the four-verse couplets known as the *cuaderna vía*) which compose the nine long works that are known to be his, the 10,000 verses of the *Libro de Alejandro* have also been attributed to him; but not all scholars are convinced of the justification for this latter claim. In 1736 appeared the first edition of any of his works, *La Vida de Santo Domingo*, published by Vergara; and in 1780 Tomás Antonio Sánchez published the complete works. Recently two of his works have been given careful editions: J. D. Fitzgerald published a critical edition of *La Vida de Santo Domingo de Silos* (Paris, 1904); and in 1913 A. G. Solalinde published a paleographic edition of *El Sacrificio de la Misa*. Consult also: J. D. Fitz-Gerald, *The Versification of the Cuaderna Vía as found in Berceo's Vida de Santo Domingo de Silos* (New York, 1905); "Gonzalo de Berceo in Spanish Literary Criticism before 1780," in the *Romanic Review*, i, 290-301 (ib., 1910); R. Becker, *Gonzalo de Berceo's Milagros und ihre Grundlagen* (Strassburg, 1910); F. Hansen, "Notas á la Vida de Santo Domingo de Silos," in *Anales de la Universidad de Chile*, vol. cxx, 715-763 (Santiago, Chile, 1907).

**GOOBER**. See PEANUT.

**GOOCH**, gōoch, SIR DANIEL (1816-89). A British mechanical engineer and inventor, born at Bedlington, Northumberland. He learned the

principles of locomotive design under Robert Stephenson. From 1837 to 1864 he was locomotive superintendent of the Great Western Railway and in this connection became known for the original design and general excellence of his locomotives. In 1843 he invented the "suspended link motion with the shifting radius link" for locomotives. In 1865-66 Gooch had charge of laying cables across the Atlantic Ocean, upon the successful completion of this task being created Baronet. In 1866 he took charge of the reorganization of the Great Western Railway, which he soon placed on a sound financial footing. From 1865 to 1885 he was a member of Parliament. Consult his *Diaries* (London, 1892).

**GOOCH**, FRANK AUSTIN (1852- ). An American chemist, born at Watertown, Mass., and educated at Harvard University (A.B., 1872; Ph.D., 1877). In 1873 he became instructor in chemistry in the Lawrence Scientific School. A year later he was assistant in the chemical laboratory and in 1877 assistant to Wolcott Gibbs. In 1879 he was connected with the chemical laboratory of the Geological Survey at Newport as a special agent of the tenth census, in 1881 was appointed chemist to the Northern Transcontinental Survey, and in 1885 became professor of chemistry at Yale. His writings include: *Outlines of Inorganic Chemistry*, with C. F. Walker (1905); *Outlines of Qualitative Chemical Analysis*, with P. E. Browning (1906; 3d ed., 1911); *Methods in Chemical Analysis* (1912).

**GOOCH**, SIR WILLIAM (1681-1751). An English soldier and Colonial Governor in America. He was born in Yarmouth, served with distinction in the English army, and from 1727 to 1747 was Governor of Virginia. He was a man of considerable ability, and his administration was, on the whole, a wise and prosperous one. In 1740 he led the Virginia troops which accompanied Admiral Vernon on his futile expedition against Cartagena, New Granada. On his return to England in 1749 he was made Baronet.

**GOOD**, JAMES ISAAC (1850- ). An American Reformed church clergyman and historian, born at York, Pa. He graduated at Lafayette College in 1872 and at Union Theological Seminary in 1875. He was settled in pastorates in York, Pa. (1875-77), Philadelphia (1877-90), and Reading, Pa. (1890-1905). Between 1890 and 1907 he was professor and dean of the school of theology of Ursinus College (Philadelphia), then becoming professor of Reformed church history and liturgies at the Central Theological Seminary (Dayton, Ohio). He was elected president of the General Synod of the Reformed Church in the United States. He wrote: *The Origin of the Reformed Church in Germany* (new ed., 1913); *The History of the Reformed Church in Germany* (1894); *Rambles around Reformed Lands; History of the Reformed Church in the United States* (1899); *Famous Places of the Reformed Churches* (1910); *History of the Reformed Church in the United States in the Nineteenth Century* (1911); *History of the Swiss Reformed Church since the Reformation* (1913); *The Heidelberg Confession in its Newest Light* (1914); and he contributed to the NEW INTERNATIONAL ENCYCLOPEDIA.

**GOOD**, JOHN MASON (1764-1827). An English physician and author, born at Epping in

**Essex.** In 1784 he practiced as surgeon in Sudbury, but removed to London in 1793, with the view of obtaining literary employment. He published various poems, translations, and professional treatises. Among his translations are: *The Song of Songs, or Sacred Idyls*, from the Hebrew (1803); *The Nature of Things*, from Lucretius (1805); *The Book of Job* (1812). His chief professional works are *The Study of Medicine* (4 vols., 1822) and *The Book of Nature*, a series of lectures at the Surrey Institution, 1811-12 (1826). He likewise published, in conjunction with Olinthus Gregory, a dictionary of the arts and sciences completed in 12 volumes (1813). The translation of Lucretius, valuable for its parallel passages, is included in Bohn's Classical Library. He died in London. For his *Life and Writings*, consult Gregory (London, 1828).

**GOODALE, ELAINE** (1863- ) and **DORA READ** (1866- ). American poets, sisters, who were born in Berkshire Co., Mass. They showed remarkable poetic precocity. Poems of Elaine appeared as early as her eighth year, in *Sky Farm Life*, a monthly conducted by herself. In 1887 verses of both sisters began to appear in *Saint Nicholas* and their contributions to periodicals were thereafter frequent. The most noteworthy of their books are: *Apple Blossoms* (1878); *In Berkshire with the Wildflowers* (1879); *All round the Year* (1880); and *Verses from Sky Farm* (1880). In 1881 Elaine published *The Journal of a Farmer's Daughter*. In 1883 she became teacher in the Hampton (Va.) Institute for the education of Indians and negroes, and in 1885 made a tour of observation through the Sioux Reservation. In the next year she received a government appointment to teach Indians at White River Camp in Dakota and in 1890 was made superintendent of all Indian schools in that State. In 1891 she was married to Dr. C. A. Eastman (q.v.), an Indian. Dora wrote also *Heralds of Easter* (1887).

**GOODALE, GEORGE LINCOLN** (1839- ). An American botanist, born at Saco, Me. He graduated at Amherst College in 1860 and at the Harvard Medical School in 1863. He practiced his profession at Portland, Me., until 1867; became professor of natural science and applied chemistry at Bowdoin; and at Harvard was appointed instructor in botany and university lecturer on vegetable physiology (1872), assistant professor of the latter subject (1873), professor of botany (1878), and (1888) Fisher professor of natural science, a chair formerly held by Asa Gray. After 1879 he served also as director of the botanical museum. In 1909 he retired. In 1889 he was president of the American Society of Naturalists and president of the American Association for the Advancement of Science. In addition to monographs and contributions to scientific journals, his publications include: *Wild Flowers of North America* (1882); *Vegetable Physiology* (1885); *Vegetable Histology* (1885); *Useful Plants of the Future* (1891); *Concerning a Few Common Plants* (1879; 3d ed., 1903).

**GOOD BEHAVIOR.** As a legal expression, used chiefly as synonymous with keeping the peace. Thus, if one person assaults or threatens another or provokes him to a breach of the peace, the offense is punishable summarily by a justice of the peace, who, besides inflicting a fine, may bind over the offending party to keep the peace and be of good behavior for a

specified period. The mode of doing this is by requiring the offending party to enter into a recognizance with or without sureties, which is, in fact, the giving of a bond for a specified sum to the court, and if it is broken, the recognizance is forfeited and the offending party may be again punished.

In early English law the expression was employed to denote the obligation of chastity imposed upon a widow who enjoyed real property derived from her deceased husband, as in the case of the dower right known as free bench (q.v.), or of a devise by a husband to his widow *dum se bene gesserit*, so long as she should be of good, i.e., chaste, behavior.

**GOOD-CONDUCT BADGES.** Special distinctions given to enlisted men in the United States navy for proficiency, sobriety, and obedience. Any person when discharged, either at expiration of enlistment of four years or within three months of expiration of enlistment, who is recommended for a good-conduct medal by his commanding officer is entitled to this badge. Recommendations are based on the following final averages in marks: for petty officers, proficiency 4.5, sobriety 4.5, obedience 4.5; for men of lower ratings, proficiency 4, sobriety 4.5, obedience 4.5. The first badge is a medal; subsequent badges are bars with the name of the vessel from which each was given engraved thereon, and are worn on a ribbon above the medal. The holder of a medal cannot be deprived of it except by sentence of a general court-martial. Every enlisted man, except a mate, receives 83 cents per month, in addition to pay of his rating, for each medal or bar he is awarded.

**GOOD CONSIDERATION.** In English and American law, the relationship which subsists between the parties to certain conveyances of land and which is relied on, in lieu of an actual consideration of money or money's worth, to sustain such a conveyance. The former, sometimes called the "consideration of blood," i.e., of blood relationship, or of "love and affection," was known as a "good" consideration, as distinguished from the latter, which was described as a "valuable" consideration. Any relationship of consanguinity, no matter how remote, was sufficient to constitute good consideration. It was required where a freehold estate was conveyed by the device known as a covenant to stand seised to the use of another or to give effect to a conveyance made without an express declaration that it was made to the use of the grantee or of some one else as beneficiary. As distinguished from the "covenant to stand seised," which required a "good" consideration, the conveyance by "bargain and sale" called for a valuable consideration. It is to be noted that neither form of consideration was necessary to the validity of a conveyance made in any other form, as by livery of seisin or the modern deed of grant, if only the instrument declared that the conveyance was for the use of the donee or grantee. Modern statutory forms of conveyancing have rendered the presence of a good consideration less important than it once was, but it would seem that it is still generally required where a deed of land fails to state that the conveyance is for the use of the grantor and where there is no valuable consideration therefor. See **USES**; **TRUSTS**.

As used in the famous statute concerning fraudulent conveyances (13 Eliz., c. 5), where



it is provided that the statute is "not to extend to any estate or interest in lands, etc., on good consideration and bona fide lawfully conveyed to any person not having notice," etc., the expression "good consideration" does not bear the technical sense in which it is employed in conveyancing, but signifies lawful, i.e., valuable, consideration. A conveyance otherwise forbidden by the statute would not be protected because made to a blood relation, but only if to an innocent purchaser for value. See CONSIDERATION.

**GOOD COUNSEL**, BOOK OF. See HITOPADESA.

**GOODE**, GEORGE BROWN (1851-96). An American ichthyologist, born in New Albany, Ind. He graduated in 1870 from Wesleyan University, at Middletown, Conn., and then studied under Louis Agassiz. From 1871 to 1877 he was curator of the museum at Wesleyan University, and in 1873 he became an assistant in the United States Fish Commission and also a member of the scientific staff of the United States National Museum, of which he was made assistant director in 1881. From 1887 until his death he served as the assistant secretary of the Smithsonian Institution in charge of the National Museum. He also was prominently connected with various popular and scientific exhibitions, as commissioner of the United States to the fisheries exhibitions at Berlin in 1880 and London in 1883, as representative of the Smithsonian Institution at the exhibitions at New Orleans in 1884, Cincinnati in 1888, Louisville in 1888, and Atlanta in 1895, and as successively commissioner and commissioner general of the United States at the Columbian Historical Exposition at Madrid in 1892-93. He planned classifications for, and was one of the directors of, the United States government exhibit at the World's Columbian Exposition at Chicago in 1893. In 1888 he was elected to the National Academy of Sciences; and at various times he received foreign honors, including the decoration of the Spanish Order of Isabella the Catholic, with the grade of Commander. His publications number about 400, of which these are important: *Catalogue of Fishes of the Bermudas* (1879); *History of the Menhaden* (1880); editor of *Fisheries and Fishery Industries of the United States* (7 vols., 1884-87); *American Fishes: A Popular Treatise upon the Game and Food Fishes of North America* (1888); *Oceanic Ichthyology*, with Tarleton H. Bean (1896). Goode was an authority on the management of museums and wrote: *Museums of the Future* (1890); *Principles of Museum Administration* (1896); *Annual Reports*, as director of the National Museum. He was also interested in historical studies and wrote: *The Beginnings of Natural History in America* (1886); *The Beginnings of American Science* (1889); *The Origin of the National Scientific and Educational Institutions of the United States* (1890).

**GOODELL**, HENRY HILL (1830-1905). An American agricultural educator, born at Constantinople, Turkey. He graduated at Amherst College in 1862 and served in the Union army during the Civil War. He was professor of modern languages and English literature in the Massachusetts Agricultural College (1867-86) and in 1886 became president of that institution. The degree of LL.D. was conferred on him by Amherst College in 1891. For many years, as chairman of the executive committee of the Association of American Agricultural

Colleges and Experiment Stations, he exerted a wide influence in the great movement for agricultural education in the United States.

**GOODELL**, THOMAS DWIGHT (1854- ). An American classical scholar, born at Ellington, Conn. He was graduated at Yale in 1877 and received the degree of Ph.D. in 1884. He was classical teacher in the high school, Hartford, Conn., from 1877 to 1888, and in the latter year was appointed professor of Greek at Yale. In 1911 he was elected president of the American Philological Association. He is author of various philological papers in the learned journals, and of *Chapters on Greek Metric* (1901), an important work, and *A School Grammar of Attic Greek* (1902).

**GOODELL**, WILLIAM (1792-1867). An American missionary. He was born at Templeton, Mass., educated at Phillips Academy (Andover), Dartmouth College, and Andover Theological Seminary. He was accepted as a missionary by the American Board and at the close of 1822 sailed for Malta and thence the next year went to Beirut, where he aided in establishing the station which has become the centre of the Syrian mission. In 1828, on account of threatened war between England and Turkey, the missionaries removed to Malta, where Goodell labored in preparing and printing books for the mission; until, in 1831, the way having been opened by the destruction of the Turkish fleet at Navarino, he went to Constantinople, where he commenced the Armeno-Turkish mission. During his missionary life he and his devoted wife cheerfully endured many trials and perils and were compelled to move their residence 33 times in 29 years. One of his chief labors was the translation of the Bible into Armeno-Turkish, in making and revising which he spent 20 years. In 1865, after 43 years of toil, he returned to the United States and died in Philadelphia at the residence of his son, Feb. 18, 1867. Consult his life by Prime (New York, 1876).

**GOODELL**, WILLIAM (1792-1878). An American editor and reformer, prominent as an abolitionist in the antislavery struggle before the Civil War. He was born in Coventry, N. Y.; was engaged in business successively at Providence, R. I., Alexandria, Va., and New York City; took part in the discussion of the Missouri Compromise, to which he was strongly opposed, and in 1827 established at Providence a paper called the *Investigator*. He subsequently edited successively the *National Philanthropist*, the *Moral Daily Advertiser*, the *Friend of Man* (Utica, N. Y.), the organ of the New York State Anti-Slavery Society, the *Radical Abolitionist*, and the *Principia*—all devoted to the cause of abolitionism. Among his publications are: *Views of American Constitutional Law* (1844); *The Democracy of Christianity* (1851); *Slavery and Anti-Slavery: A History of the Great Struggle in Both Hemispheres* (1852); *The American Slave Code* (1853). Consult a *Memorial of William Goodell* (Chicago, 1879).

**GOOD FAITH** (Lat. *bona fides*). In law, either (1) an absence of fraudulent design in the person acquiring real or personal property by conveyance from another, or (2) ignorance on the part of an assignee or grantee of the existence of claims of third persons affecting the property conveyed. The expression is used in the former sense in the statute (13 Eliz., c. 5)



making void conveyances in fraud of creditors, but saving conveyances "on good consideration and bona fide lawfully" made. This does not mean that the grantee must be ignorant of the fact that the effect of the conveyance will probably be to delay or defraud the creditors of the grantor, but that he shall not be a party to the fraud by participating in an unreal or fictitious conveyance. As thus employed, the expression does not differ materially in meaning from its ordinary sense as signifying honest dealing.

On the other hand, as used to denote the innocent holder, commonly known as the bona fide holder, of commercial paper, it signifies no more than that the present holder came into possession of the paper in due course and without notice of defenses, such as lack of consideration, which would have been available against the transferor. It is in this latter sense also that the expression is employed where property affected with a trust in favor of a third person is conveyed by the trustee to a purchaser who has no knowledge of the trust. The person acquiring the property under such circumstances takes it free from the trust, not because he is free from moral turpitude, but because, having paid value therefor in ignorance of the trust, it is deemed unconscientious to subject the property in his hands to the obligation which rested upon his grantor. See **NEGOTIABLE PAPER; TRUST**.

**GOOD FRIDAY.** The Friday before Easter, observed in commemoration of the crucifixion of Christ. That from a very early period it was a day of solemn mourning and special prayer is apparent from the *Apostolic Constitutions* (i. 18) and from Eusebius, who tells us that, when Christianity was established in the Empire, Constantine forbade the holding of markets, law courts, and other public proceedings upon this day. It is still a legal holiday in England and Ireland. A number of ancient popular customs, such as the eating of "hot cross buns"—cakes with a cross impressed on them—are connected with the day. For its ceremonial observance in the Roman Catholic church, see **CROSS; HOLY WEEK**. A service of modern origin, increasingly popular in Catholic and Episcopal churches, is the Three Hours' Devotion, consisting of addresses upon the seven last words of Christ, prayers and hymns, and occupying the hours from 12 to 3, when He hung upon the cross.

**GOOD GRAY POET, THE.** A popular designation of Walt Whitman.

**GOOD HOPE.** See **CAPE OF GOOD HOPE**.

**GOOD/HUE, BERTRAM GROSVENOR** (1869- ). An American architect. He was born at Pomfret, Conn., was educated at Russell's Collegiate and Commercial Institute, New Haven, Conn., and studied architecture for six and a half years under J. Renwick. In 1891 he became a partner in the firm of Cram and Wentworth (later Cram, Goodhue, and Ferguson) and in this connection participated in the reconstruction and additions to the United States Military Academy and in the construction of numerous ecclesiastical, academic, library, and other buildings (for list of these, see **CRAM, RALPH ADAMS**). In 1914 he was engaged to plan a new building for St. Bartholomew's Church, New York. He made the decorations for *The Altar Book*, contributed articles to magazines and to Sylvester Baxter's *Spanish*

*Colonial Architecture in Mexico* (10 vols., 1903), and is author of *Mexican Memories* (1892).

**GOODLAND.** A city and the county seat of Sherman Co., Kans., 196 miles east of Denver, on the Chicago, Rock Island, and Pacific Railroad (Map: Kansas, A 4). It contains a Carnegie library, has railroad repair shops and a grain elevator, and carries on a trade in the products of the adjacent farming and stock-raising district. There are municipal water works. Pop., 1900, 1059; 1910, 1993.

**GOODMAN'S FIELDS THEATRE.** A London theatre, erected in 1729 and torn down in 1746. The theatre erected later upon its site was destroyed by fire in 1802. Garrick made his appearance on its stage in 1741, and many of his most successful performances occurred in this playhouse.

**GOOD-NATURED MAN, THE.** A comedy by Goldsmith, produced by Colman at Covent Garden, Jan 29, 1768.

**GOODNOW, FRANK JOHNSON** (1859- ). An American educator and legal scholar, born in Brooklyn, N. Y. He graduated at Amherst College in 1879, at the Columbia Law School in 1882, and studied at the Ecole Libre des Sciences Politiques, Paris, and at the University of Berlin. Appointed instructor in history and lecturer in administrative law at Columbia University in 1883, he was promoted to the rank of adjunct professor in 1887 and to a full professorship in 1891. In 1906 he was a member of the Public Ownership Commission of the National Civic Federation, which investigated municipal ownership undertakings in Europe. During the years 1913-14 he served as legal adviser to the Chinese government. In 1914 he became president of Johns Hopkins University. His works include: *Comparative Administrative Law* (1893); *Municipal Problems* (1897); *Politics and Administration* (1900); *City Government in the United States* (1905); *Principles of the Administrative Laws of the United States* (1905). He was editor of *Selected Cases on the Law of Taxation* (1905); *Selected Cases on Government and Administration* (1906); *Selected Cases on the Law of Officers* (1906); *Social Reforms and the Constitution* (1914).

**GOOD PARLIAMENT.** The English Parliament of 1376, famous for its attempts at political reform and for its impeachment of Latimer, Neville, and others.

**GOOD QUEEN ANNE.** A designation of Anne of Bohemia, wife of Richard II of England.

**GOOD QUEEN BESS.** A popular name for Elizabeth, Queen of England.

**GOOD REGENT, THE.** A title given to James Stuart, Earl of Murray, or Moray, who was Regent of Scotland between 1567 and 1570.

**GOODRICH, ALFRED JOHN** (1847- ). A widely known American musical theorist. He was born at Chilo, Ohio, and was practically self-taught. He held appointments as professor of theory in many of the leading musical institutions in the United States and for two years served on the faculty of the Martha Washington College, Abingdon, Va. After 1899 he devoted himself to private teaching and writing. His essays and other published works include: *Music as a Language* (1880); *The Art of Song* (1888); *Complete Musical Analysis* (1889); *Analytical Harmony* (1894); *The Theory of Interpretation* (1898); *Synthetic Counterpoint* (1903).

**GOODRICH, CASPAR FREDERICK** (1847–). An American naval officer, born in Philadelphia. He graduated from Annapolis in 1864 and served on the *Macedonian* in the summer of that year. Promoted through the various grades, he became captain in 1897 and rear admiral in 1904. He served as naval attaché on the staff of Sir Garnet Wolseley during the Tel-el-Kebir campaign in 1882, brought the Greely relief ship *Alert* to New York in 1884, was in charge of the Torpedo Station in 1886–89, and was president of the Naval War College in 1897–98. During the Spanish-American War he commanded the *St. Louis* and *Newark*. He was commandant of the Portsmouth (Va.) Navy Yard in 1903–04 and of the New York Navy Yard in 1907–09 and was commander in chief of the Pacific squadron in 1905–06.

**GOODRICH, CHARLES AUGUSTUS** (1790–1862). An American author, brother of Samuel G. Goodrich (q.v.). He was born at Ridgefield, Conn.; graduated at Yale in 1812; was long pastor of congregations at Worcester, Mass., Berlin, Conn., and Hartford, Conn.; and became favorably known through his writings, which include: *Lives of the Signers to the Declaration of Independence* (1829); *Family Tourist* (1848); *Geography of the Chief Places Mentioned in the Bible* (1855); *History of the United States* (1852–55; rev. ed., 1867).

**GOODRICH, CHAUNCEY ALLEN** (1790–1860). An American scholar, born at New Haven, Conn., and son of Elizur Goodrich. He graduated at Yale University in 1810, was a tutor there from 1812 till 1814, and then studied theology. He was ordained pastor of the First Congregational Church in Middletown, Conn., in 1816; in 1817 he resigned his charge to become professor of rhetoric in Yale. This chair he held until 1839, when he was transferred to that of pastoral theology in the Divinity School. He published a *Greek Grammar* (1814); *Greek and Latin Lessons* (1832); *Select British Eloquence* (1852); and superintended the abridgment of *Webster's Dictionary* (1847). At the time of his death he was engaged in a revision of this work, which afterward was published under the supervision of Noah Porter (1864). From 1829 till 1838 Dr. Goodrich edited the *Quarterly Spectator*.

**GOODRICH, ELIZUR** (1734–97). An American Congregational clergyman. He was born in Wethersfield (now Rocky Hill), Conn., graduated at Yale in 1752, and from 1756 to 1797 was pastor of a church at Durham, Conn. He devoted much of his time to the study of the mathematical and astronomical sciences and wrote an excellent account of the aurora borealis of 1789.

**GOODRICH, FRANK BOOTT** (1826–94). An American author, son of Samuel Griswold Goodrich. He was born in Boston, graduated at Harvard in 1845, and was for some time the Paris correspondent of the *New York Times*, writing under the signature of "Dick Tinto." His articles were published in book form in 1854, under the title *Tri-Colored Sketches of Paris*. Goodrich also published: *The Court of Napoleon* (1857); *History of Maritime Adventure, Exploration, and Discovery* (1858); *Women of Beauty and Heroism* (1859); *World-Famous Women, from Semiramis to Eugénie* (1890); *Remarkable Voyages: or, Man upon the Sea* (1873).

**GOODRICH, JOSEPH KING** (1850–). An American writer on Oriental and other sub-

jects. He was born in Philadelphia and was educated in the Hopkins Grammar School of New Haven, Conn. He organized the department of ethnology in the United States National Museum at Washington in 1881–84, was assistant editor of the Smithsonian Institution in 1884–86, and from 1886 to 1910 served as professor of English at the Imperial Government College at Osaka, Japan, and later at Kyoto, Japan. He is author of *The Coming China* (1911); *Africa of To-Day* (1912); *Russia in Europe and Asia* (1912); *The Coming Mexico* (1913); *Our Neighbors—The Japanese* (1913); *Coming Hawaii* (1914); and articles on Chinese and Japanese art, language, and literature.

**GOODRICH, SAMUEL GRISWOLD** (1793–1860). An American author, who wrote under the pseudonym "Peter Parley," and perhaps was most widely known for his school histories. He was born in Ridgefield, Conn., Aug. 19, 1793. He was a book publisher in Hartford, and later in Boston, Mass., where he edited the *Token* (1828–32), an original annual noted for the encouragement given to young American authors. His numerous juvenile and educational works gave him a wide reputation. Altogether in his life he edited or wrote some 170 volumes under his pseudonym, of which, however, he was sole author of only the following: *The Outcast, and Other Poems* (1836); *Sow Well and Reap Well: or, Household Education* (1838); *Five Letters to my Neighbor Smith* (1839); *Sketches from a Student's Window* (1841); *Ireland and the Irish* (1842); *Poems* (completed, 1851); *Recollections of a Lifetime: or, Men and Things I Have Seen* (1856); *Peter Parley's Own Story* (1864). He was United States Consul at Paris in 1852, where he published a statistical work on the United States. He died at Hartford, Conn., May 9, 1860.

**GOODRICH, or GOODRICKE, THOMAS** (c.1485–1554). An English ecclesiastic. He studied at Corpus Christi College, Cambridge, and in 1510 was made a fellow of Jesus College. As rector of St. Peter Cheap (1529), he was consulted on the legality of the marriage of Catharine of Aragon and was appointed syndic of Cambridge for the settlement of that question (1530). Soon after he became chaplain to the King and in 1533 went to France on an embassy. In the following year he became Bishop of Ely and proved a zealous partisan of the Reformation, urging the spiritual headship of the King and helping compile the *Bishops' Book*. Under Edward VI he became a member of the Privy Council and was one of the compilers of the Book of Common Prayer. In 1552 he became Lord High Chancellor and sealed Edward's settlement of confession, but was ignorant of its contents. He was pardoned by Queen Mary for his part in placing Lady Jane Grey on the throne and, although he lost the chancellorship, was permitted to keep his bishopric until his death, May 10, 1554.

**GOODRICH, (JOHN) WALLACE** (1871–). An American musician, born at Newton, Mass. He studied at the Royal Academy of Music, Munich, in 1894–95, and in Paris and Leipzig for two years, and in 1897 joined the faculty of the New England Conservatory of Music, where he was appointed dean in 1907. He was organist of Trinity Church, Boston (1902–09), and of the Boston Symphony Orchestra (1897–1909), and conducted (1901–07) the Choral Art

Society of Boston, which he had founded, the Worcester County Musical Association (1902-07), the Cecilia Society of Boston (1907-10), and the Boston Opera Company (1909-12). He published *Syllabus of the Course of Lectures upon the Ritual Music of the Protestant Episcopal Church in the United States of America* (1912).

**GOODRICKE, THOMAS.** See GOODRICH, THOMAS.

**GOODS AND CHATTELS.** A legal as well as popular expression, in common use, to signify personal property. The two words are not identical in meaning, however, the term "chattels" being the more extensive in signification and including the other. The term "goods" corresponds closely in meaning to the *bona* of the common law and to *movables* of the civil law, i.e., chattels movable, including domestic animals and certain incorporeal rights such as copyrights, patent rights, etc.; whereas chattels includes as well certain rights in land, i.e., *chattels real*, such as estates for years, the interest of a mortgagee in mortgaged land, etc. The term "goods" is now generally employed as coextensive in meaning with the old expression, "goods, wares, and merchandises," used in the seventeenth section of the Statute of Frauds. See BONA; CHATTEL.

**GOODSELL, DANIEL AYRES (1840-1909).** An American Methodist Episcopal bishop, born in Newburgh, N. Y. He graduated at the University of the City of New York in 1859 and soon after entered the Methodist ministry. He was elected Bishop in 1888. Besides contributions to the religious press, he wrote *Nature and Character at Granite Bay* (1901), a book which in its general character suggests the genius of Burroughs; *The Things which Remain, an Address to Young Ministers* (1904); *Peter the Hermit*, in "Men of the Kingdom Series" (1906).

**GOODSIE, JOHN (1814-67).** A Scottish anatomist, born at Anstruther, Scotland. He studied at St. Andrews University; graduated in medicine at the Royal College of Surgeons, Edinburgh; practiced in Anstruther; was made conservator of the museum of the College of Surgeons, Edinburgh (1840); acted as lecturer on pathology of tumors from 1842 to 1843; was assistant professor of anatomy, University of Edinburgh, from 1844 to 1846; and succeeded Munro as professor of anatomy in 1846. Consult *Memoir*, by Turner (Edinburgh, 1868).

**GOODSON, KATHARINE (1872- ).** A distinguished English pianist, born in Watford (Hertfordshire). In 1886 she entered the Royal Academy of Music, where she studied under Beringer until 1892. For four years (1892-96) she was a pupil of Leschetizky in Vienna. Immediately after her return she made her debut in London, meeting with unusual success. In 1899-1900 she made a triumphal tour of Germany and Austria. Her first American tour was in 1907, when she was received with such enthusiasm that she made several subsequent visits. Her special characteristics are a marked individuality of style and extraordinary magnetism. In 1903 she was married to the English composer Arthur Hinton (q.v.).

**GOODSPEED, (JOSEPH) ARTHUR WILLIS (1860- ).** An American physicist, born at Hopkinton, N. H. He graduated from Harvard University in 1884 and in 1889 from the University of Pennsylvania (Ph.D.), where he was an assistant in 1884-85, an instructor in 1885-

89, an assistant professor in 1889-1904, and professor of physics after 1904. His scientific articles deal mostly with the Röntgen rays and their application, with radioactivity, and with constants of the induction coil.

**GOODSPEED, EDGAR JOHNSON (1871- ).** An American Greek scholar, born at Quincy, Ill. He graduated from Denison University (Ohio) in 1890 and studied also at Yale, Chicago (Ph.D., 1898), and Berlin. After teaching the classics for several years in preparatory schools, he was appointed to the faculty of the University of Chicago, becoming associate professor in 1911. In 1902 he was made assistant director of the Haskell Oriental Museum. He joined the editorial staff of the *American Journal of Theology* and is editor or author of *Greek Papyri from Cairo Museum* (1902); *Asterius*, with Galusha Anderson (1904); *Homeric Vocabularies*, with William B. Owen (1906; 2d ed., 1909); *Index Patristicus* (1907); *The Epistle to the Hebrews* (1908); *Index Apologeticus* (1912); *Die griechische Apologeten*, with M. Sprengling (1914); *The Freer Gospels* (1914).

**GOOD TEMPLARS, INTERNATIONAL ORDER OF.** A world-wide fraternal society, having for its object the promotion of total abstinence for the individual and prohibition for the state and nation and the world, organized at Syracuse, N. Y., in 1851. The Right Worthy Grand Lodge was organized at Cleveland, Ohio, in 1855.

The order was introduced in England in 1868 and in a short time spread throughout the civilized world, its ritual being translated into some 18 different languages. The question of admission of colored persons in 1874 caused a schism in the organization; a section of the order then organized under the name of the Right Worthy Grand Lodge of the World. The two branches were reunited through the efforts of John B. Finch, R.W.G.T., at Saratoga, N. Y., in 1887. The Prohibition party was formed in 1869 by a committee appointed by the Right Worthy Grand Lodge. The Woman's Christian Temperance Union was formed in 1874 by Good Templar women. The Washingtonian House for Inebriates at Chicago, Ill., and the Orphans' Home at Vallajo, Cal., were founded by the order. The name of the supreme governing body of the order has been changed to International Supreme Lodge, which meets triennially. The College of Good Templary is maintained by the order. The course of study, covering from one to three years, is designed to inculcate the principles of the temperance reform movement. Its graduates receive the degree of Master of Temperance Literature.

The organization in 1914 comprised two national Grand Lodges (United States and Canada), 67 Grand Lodges, aggregating 680,665 members, including 263,410 in the Juvenile branch, distributed through the United States, Great Britain, Germany, Denmark, Sweden, Norway, France, Switzerland, Asia, South Africa, Australia, and New Zealand. Members are required to pledge "that they will never buy, sell, use, furnish, or cause to be furnished, to others as a beverage, any spirituous or malt liquors, wine, or cider, and will discountenance the manufacture and sale thereof in all proper ways."

**GOOD WILL.** The favorable disposition or inclination of persons to extend their patronage to a particular firm or corporation on account of the reputation it has established. Good will is something more than the probability that

old customers will resort to the old place. It includes every advantage or benefit accruing to a business establishment from its locality, name, or common reputation, from its business habits, connections, and standing, or from any other matter which identifies and distinguishes it from other establishments. The good will of a business is property as much the subject of valuation and transfer as any tangible chattel. It is an asset of a business and may be taken into account in deciding whether a business establishment is solvent or insolvent. In a litigated case in England the good will of a partnership was valued at £20,000. The New York Court of Appeals has decided that the good will of a corporation organized under the laws of another State, but having its place of business in New York, is taxable in New York as property employed there by the corporation. Under the dissolution of a partnership, as in case of death of a partner, the good will of the concern must be converted into cash and its proceeds distributed, precisely as though it were tangible property. Upon a sale of the entire partnership business and assets the purchaser becomes entitled to the good will. This includes the sole right to hold himself out as the successor of the firm. In England and in some of the United States he acquires the right to use the old firm name, subject only to the qualification that he must not hold out the former partners as doing business under the old name, while in other States such right can be acquired only by express agreement to that effect.

The extent to which the seller of the good will of a business can compete with the buyer is a subject upon which the authorities are at variance. The tendency of modern decisions in England is to limit the seller more narrowly than the courts have felt disposed to do in the United States. Accordingly they hold that the seller of a good will must not in any way solicit patronage from the customers of the old business, nor in any way represent himself as succeeding to such business. In the absence of a contract to the contrary, however, he may engage in the same line of business in the same locality and in his own name, although that name may be a part of the old business name. In the United States, on the other hand, the seller of a business may usually compete with the buyer provided the competition be fair and free from fraud. If the purchaser of a good will would cut the seller off from soliciting old customers he must secure from him a contract surrendering those rights. Consult: Pollock, *Digest of Partnership*, § 39 (8th ed., London, 1905); Sebastian, *The Law of Trademarks* (4th ed., ib., 1889); Hopkins, *The Law of Trademarks, Trade-names, and Unfair Competition* (2d ed., Chicago, 1905); Dicksee and Tillyard, *Goodwill and its Treatment in Accounts* (3d ed., New York, 1906); Lindley, *Treatise on the Law of Partnership* (8th ed., Toronto, 1912). See RESTRAINT OF TRADE, CONTRACTS IN.

**GOODWIN, ARTHUR** (1593-1643). An English soldier, prominent during the Civil War in England. He studied at Magdalen College, Oxford, with his lifelong friend, John Hampden, and with the latter contributed Latin verses to the college collection, *Luctus Posthumus*, published on the death of Henry, Prince of Wales. He became a member of the Inner Temple in 1613; entered Parliament in 1620 and was elected again in 1623, 1625, and 1640; and on

the outbreak of the Civil War was appointed colonel of a regiment of cavalry which proved of great assistance to the Parliamentary party. In 1642, aided by Hampden and Lord Brooke, he defeated the Earl of Northampton at Coventry in Warwickshire, and with the aid of Colonel Hurry drove Lord Digby from Wantage. In January, 1643, Goodwin was appointed commander in chief of the forces of Buckinghamshire, was defeated in an attack on Brill, and took an active part in the siege of Reading.

**GOODWIN, HARRY MANLEY** (1870- ). An American physicist and chemist, born in Boston. He graduated in 1890 from Massachusetts Institute of Technology, where, though at intervals absent for study at Harvard University and at the universities of Leipzig and Berlin, he was a member of the faculty after 1890, in 1906 becoming professor of physics and electrochemistry with supervision of the department of electrochemistry. He is known for his studies on the voltaic cell, on the viscosity of mercury vapor and of fused salts, and on the electric conductivity of dilute acid solutions. He is author of *Physical Laboratory Experiments* (1904; 3d ed., 1911) and *Elements of the Precisions of Measurements and Graphical Methods* (1908; 4th ed., 1913).

**GOODWIN, JOHN** (c.1594-1665). An English Puritan divine. He was born in the County of Norfolk about 1594, graduated at Queen's College, Cambridge, and obtained a fellowship there in 1617. Having married, he gave up his fellowship and took orders, officiating in various places in the county with much acceptance. In 1632 he removed to London and in 1633 succeeded John Davenport (q.v.) at St. Stephens. In 1635 he was admonished for leanings towards independency. In 1639 he occasioned dissatisfaction by insisting on the need of a learned ministry. In 1642 he published *Anti-Cavalierism*, in support of the Parliamentary cause, which received further commendation in *Might and Right Well Met* (1648). In 1643 he assailed the theory of the divine right of kings in his *Os Ossorianum*; or, *A Bone for a Bishop* and in 1644 denounced the Presbyterians as a persecuting party in *Θεομαχία*; or, *The Grand Imprudence of Fighting Against God*. In 1645 he was ejected from his living for refusing to administer the sacrament to all indiscriminately and formed an independent church, which was largely attended. At the Restoration he was one of 18 incapacitated from holding any public trust. He died in 1665. Many of his publications, though all in English, have Greek or Latin titles. He has been a favorite with Methodists and been called the "Wielcl of Methodism." John Wesley abridged his *Treatise of Justification* (London, 1642). Samuel Dunn, a Wesleyan minister, edited his *Christian Theology* (London, 1836) from Goodwin's works and wrote his life. His *Redemption Redeemed* was republished in London in 1842. The standard life of Goodwin is by Thomas Jackson, another Wesleyan minister (London, 1822).

**GOODWIN, NAT(HANIEL) C(ARL)** (1857- ). An American actor. He was born in Boston and after a brief experience in business made his debut, on March 5, 1874, at the Howard Athenæum, in a piece called *Law in New York*. His success in imitating personal peculiarities led him to the variety stage, and at Pastor's Theatre, in New York (1875), he became very popular. Later he made a hit in the burlesque

of *Black-Eyed Susan*. He married in 1877 Eliza Weathersby, an actress, under whose name his company toured successfully. Most of his work was in lighter comedy, till in 1889-90 he appeared as Woolcott in *A Gold Mine*. The following summer he first played in England. Among his productions since have been: *A Gilded Fool*; *In Mizzoura*; *An American Citizen*; *Nathan Hale*, his greatest success (produced in Chicago, Jan. 31, 1898); *The Cowboy and the Lady* (1899); *The Altar of Friendship* (1902); *A Midsummer Night's Dream* (1903); *Beauty and the Barge* (1905). In 1907 he toured in repertoire, in 1911 he played in vaudeville, and in 1912-13 he made a great success, artistic and financial, as Pugin in the centenary production of *Oliver Twist*. Consult: Strang, *Famous Actors of the Day in America* (Boston, 1900); McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896); Winter, *The Waiter of Time* (2 vols., ib., 1913); and the autobiographical *Nat Goodwin's Book* (Boston, 1914).

**GOODWIN, THOMAS** (1600-80). An English divine of the later Puritan period. He was born at Rollesby, Norfolk, studied at Cambridge, and became a fellow in 1620. In 1625 he was licensed a preacher of the university, and three years later became lecturer of Trinity Church, Cambridge, and was presented the vicarage by the King in 1632. Harassed by the interference of his Bishop, who was an adherent of Laud, he resigned his preferments and left the university in 1634. He then seems to have lived for some time in London as a Separatist preacher. In 1639 he withdrew to Holland and for a few months was pastor of a small congregation of English merchants and refugees at Arnheim. Returning to London soon after Laud's impeachment by the Long Parliament (1640), he ministered for 10 years to an independent congregation in the parish of St. Dunstan-in-the-East and rapidly rose to considerable eminence as a preacher. In 1643 he was elected a member of the Westminster Assembly and at once identified himself with the Congregational party. He frequently preached by appointment before the House of Commons, and in January, 1650, his talents and learning were rewarded with the readership of Magdalen College, Oxford, a post which he held until the Restoration (1660). He rose into high favor with the Protector and ultimately became somewhat prominent among his more intimate advisers. From 1660 until his death, Feb. 23, 1680, he lived in London and devoted himself exclusively to theological study and to the charge of a small congregation. Five volumes of his works were published at London (1682-1704; reprinted in Edinburgh, 1861-66).

**GOODWIN, WILLIAM WATSON** (1831-1912). A distinguished American classical scholar, born at Concord, Mass. He was graduated from Harvard in 1851 and then continued his studies at the universities of Bonn, Berlin, and Göttingen, receiving from Göttingen the degree of Ph.D. in 1855. He was tutor at Harvard (1856-60) and Eliot professor of Greek there (1860-1901). In 1901 he became Eliot professor emeritus. He was the first director of the American School of Classical Studies at Athens (1882-83) and in 1872 and 1885 was president of the American Philological Association. In 1860 he published the first edition of his *Syntax of the Moods and Tenses of the Greek Verb*. This work has contributed more than any other single book

in America and England to the elucidation of Greek syntax and it has received generous recognition in Germany. It was published in revised and enlarged form in 1865 and 1890. He published also a *Greek Grammar* (1870; last ed., 1893). Both these books owed much, in their later editions, to the writings of B. L. Gildersleeve (q.v.). He edited also Demosthenes (*On the Crown* (Cambridge, 1901) and Demosthenes *Against Meidias* (ib., 1906), scholarly works both, showing thorough knowledge of Attic law and Greek history. He was also a contributor to American journals and scientific publications, especially to the *Transactions of the American Philological Association* and *Harvard Studies*. Professor Goodwin received the degree of LL.D. from Amherst (1881), Cambridge, England (1883), Columbia (1887), Edinburgh (1890), Harvard (1891), Chicago (1901), Yale (1901), D.C.L., Oxford (1890); and was also Knight of the Greek Order of the Saviour. Consult Gildersleeve, *American Journal of Philology*, xxxiii, 367-368 (New York, 1912), and Eliot, *William Watson Goodwin* (Boston, 1913).

**GOODWIN SANDS.** Dangerous banks of shifting sands stretching for a distance of about 10 miles northeast and southwest, 5 to 12 miles off the east coast of Kent, England (Map: England, H 5). The sands are divided into two portions by a narrow channel, and at low water many parts are uncovered. When the tide recedes, the sand becomes firm and safe; but during the flow the water permeates the mass, rendering the whole pulpy and treacherous, in which condition it shifts to such a degree as to render charts uncertain from year to year. They have always been dangerous to vessels passing through the Strait of Dover, bound either for the Thames or traversing the North Sea. They serve, however, as a breakwater to form a secure anchorage in the Downs (q.v.) when east or southeast winds are blowing, but become dangerous when the wind blows strongly off shore, at which time ships are apt to drag their anchors and to strand upon the Goodwin breakers, in the shifting sands of which their wrecks are soon entirely swallowed up. Many celebrated and terribly fatal wrecks have occurred here, and many gallant rescues by local seamen have been made. Numerous buoys, fog sirens, warning guns, four lightships, and the North and South Foreland lighthouses now afford a valuable system of warning and protection. These sands are said to have consisted at one time of about 4000 acres of lowland, fenced from the sea by a wall. At the period of the Norman Conquest these estates were taken from Earl Godwin and bestowed upon the abbey of St. Augustine at Canterbury, the abbot of which allowing the sea wall to fall into a dilapidated condition, in the year 1100, the sea rushed in and submerged the whole. Near the Goodwin Sands the Dutch won a naval victory over the English in 1652.

**GOODWOOD.** An estate of the Duke of Richmond and Gordon, 3 miles east of Chichester, Sussex, England, chiefly noted for the annual race meeting held in July on the course established in the park in 1802. The castle, an eighteenth-century structure, has a fine collection of portraits by old masters; the park is celebrated for the beauty and variety of its trees and contains herds of deer. In it is a temple containing a Roman relief of Neptune and Minerva found at Chichester.

**GOODYEAR, CHARLES** (1800-60). An

American inventor, born at New Haven, Conn. He was the son of an iron manufacturer, with whom, at the age of 21, he went into business in Philadelphia. Unsuccessful in the iron trade, his attention was attracted to the manufacture of India rubber, and he expended all his means in experiments with various mixtures and processes which should remedy the fatal defects of India rubber in its natural state, since it is brittle in cold weather and sticky in warm weather. His efforts were a series of failures, excepting a partial success in treating the surface of rubber goods with nitric acid, until he bought of one Hayward, a rival experimenter, an invention for mixing India rubber with sulphur. The great secret of vulcanizing—a process in which the two substances, submitted to a high temperature, are converted into the elastic, enduring, and heat-and-cold-defying material now in use—was an accidental discovery made by Goodyear while standing by a stove and idly subjecting a mixture of rubber and sulphur to its heat. This new product he patented in 1844, discovering new uses to which it could be applied, until it required 60 patents to secure his inventions. Some of these rights were secured by other persons in England, and in France they were forfeited by an informality; so that, by these means and from expensive lawsuits, he gathered little save the honors awarded to his skill and perseverance. See RUBBER. Consult biographical sketch in Parton, *Famous Americans of Recent Times* (Boston, 1867; 11th ed., 1897), and B. K. Peirce, *Trials of an Inventor* (New York, 1866).

**GOODYEAR, ELLSWORTH D. S.** (1827-1910). An American soldier and inventor, born at New Haven, Conn. In 1846 he moved to New York City, where he engaged in the rubber trade. Sharing in the experiments that have gained renown for his family's name, he himself invented a process of making hollow rubber goods. During the Civil War he was captain for three years of a company of the Tenth Connecticut Volunteers. Promoted lieutenant colonel, he commanded a regiment in General Grant's line of battle before Petersburg, Va. On April 2, 1865, he led the assault on Fort Gregg and in spite of frightful losses succeeded in holding the position gained by his regiment. For this service he was brevetted brigadier general. In 1867 he was a member of the Connecticut Legislature, and from 1868 to 1884 he was United States customhouse inspector at New Haven, Conn.

**GOODYEAR, WILLIAM HENRY** (1846- ). An American art historian and curator. He was born in New Haven, Conn., the son of Charles Goodyear (q.v.), the inventor; graduated at Yale in 1867; and studied art history in Heidelberg and in Berlin (1867-70). He traveled extensively in Europe and the near Orient in making his original studies, especially in architecture. From 1881 to 1886 he was curator in the Metropolitan Museum of Art, New York, and after 1899 he was curator of fine arts in the Brooklyn Institute Museum. Professor Goodyear is especially known for his discoveries in the architectural refinements, particularly in mediæval church buildings. In numerous contributions to scientific periodicals he demonstrated that Egyptian, Greek, Roman, and mediæval buildings are constructed with intentional asymmetry, intended for optical effects. He became honorary member of societies

in Rome, Edinburgh, Milan, and Venice, and a corresponding member of the Society of American Architects. His principal publications include: *A History of Art* (1887); *The Grammar of the Lotus* (1891); *Roman and Mediæval Art* (1893); *Renaissance of Modern Art* (1894); *Greek Refinements* (1912).

**GOODY TWO-SHOES.** A familiar nursery tale, published by Newbery in 1765 and ascribed to Oliver Goldsmith.

**GOOGE, GOOJ, BAENABE** (1540-94). An English poet. He was born in 1540 at Alvingham in Lincolnshire, studied at Cambridge and at Oxford, traveled on the Continent, and on his return became one of the gentlemen pensioners in the court of Queen Elizabeth. Consult "Eglogs, Epytaphes, and Sonnetes"—originally published in 1563—in Arber, *English Reprints* (London, 1871), and *The Popish Kingdome* (1570), a verse translation from the Latin of Thomas Naogeorgus (i.e., Thomas Kirchmayer), ed. by Hlope (London, 1880).

**GOOKIN, DANIEL** (1612-87). A New England soldier and historian, born in Kent, England. Gookin came with his father to Virginia in 1621, but, sympathizing rather with the Puritan than with the Cavalier, he moved, in 1644, to Cambridge, Mass., where he was soon made captain of militia and elected to the House of Deputies, of which he became Speaker in 1651. In 1652 he was elected magistrate and in 1656 appointed superintendent of all Indians under civil authority. He held this office till death in spite of unpopularity occasioned by the protection he gave to his wards during and after King Philip's War. He was associated with Eliot in mission work among the Indians. He visited England in 1656 and again in 1657, efficiently protecting on his return in 1660 the fugitive regicides Goffe and Whalley. In 1674 he wrote *Historical Collections of the Indians of Massachusetts* (published by the Massachusetts Historical Society, 1792), and later a never-published and now lost *History of New England*. In 1677 he finished *An Historical Account of the Doings and Sufferings of the Christian Indians of New England*, which was sent to England, and there lost for over a century and a half, when it was found and printed in 1836 by the American Antiquarian Society. In 1681 Gookin was made major general of the Colony and was an active asserter of popular rights in the agitation which preceded the withdrawal of the Colonial Charter (1686). He was a man of fine character and an historian of balanced judgment and dignified, though not easy, style. Consult F. W. Gookin, *Daniel Gookin . . . his Life and Letters* (privately printed, Chicago, 1912).

**GOOLE, GOOL.** A market town and river port in the West Riding of Yorkshire, England, 22 miles south-southeast of York, on the right bank of the Ouse at its junction with the Don, 47 miles from the open sea at the mouth of the Humber (Map: England, F 3). The town is well built and possesses fine modern public buildings. Water and gas are supplied by private companies. It has iron foundries, ship and boat-building establishments, and extensive manufacturing of woolen and cotton goods, ropes, sails, alum, sugar, and agricultural implements. It has a commodious harbor, wet and dry docks, quays, and warehouses, and imports raw wool, linen yarn, timber, logwood, indigo, oil, wines, farm produce, and groceries. Its chief exports are coal, woolen and linen goods, and machinery.

It has a passenger service with Antwerp, Amsterdam, Copenhagen, and other ports in north Europe. The value of its imports for 1912 amounted to about \$44,581,000 and its exports to \$54,891,000. The total tonnage of vessels entered and cleared in foreign and colonial trade was 1,449,161 tons. Its rise from an obscure hamlet dates from the opening of the Knottingly Canal, which brought about its establishment as a bonded port in 1829. Pop., 1901, 16,576; 1911, 20,332.

**GOORKHAS**, gōōr'kas. See GURKHAS.

**GOOROO**, gōō'rōō. See GURU.

**GOOSAN'DER**. See MERGANSER.

**GOOSE** (AS. *gōs*, Icel. *gās*, OHG. *gans*, Ger. *Gans*; connected with Lat. *anser*, Gk. *χην*, *chēn*, OIr. *géis*, Lith. *zansis*, Skt. *hamsa*, goose, also ultimately with OHG. *ganazzo*, AS. *ganot*, Eng. *gannet*, and AS. *gandra*, Eng. *gander*). A web-footed bird of the subfamily Anserinæ, of the family Anatidæ, order Anseres (q.v.). The geese are closely allied to the swans on the one hand and to the ducks on the other. They differ from the swans in having the lores feathered and from the ducks in having the tarsi reticulate and the sexes alike in color. The geese form a fairly well-defined group of about 40 species found in all parts of the world. They are mostly larger than ducks and have longer necks. They are more terrestrial and many times are to be seen feeding on land herbage. They walk better than ducks, the legs not being quite so far back. Most of them are good eating, but there are a few, which are animal feeders, whose flesh is rank. Like the swans, they resent intrusion by hissing with outstretched neck. They utter characteristic notes called *honking* when on the wing. They generally fly in companies, each led by an old gander, which they follow in a wedgelike formation.

**Wild Geese.** Of the ten or twelve species of geese occurring in the United States, all but two or three breed in the far north and are migrants and winter visitants south of Canada. The common wild goose (*Branta canadensis*) is abundant throughout North America. It is about 3 or 3½ feet long and 5 feet across the wings. The head and neck are black, with a white patch on the chin; general color brownish gray, paler below. The nest is usually on the ground, but sometimes in trees. The eggs are usually five or six, plain buffy white. A remarkable Arctic goose is the emperor goose (*Phalacrocorax*), about two-thirds as large as the common goose, abundant on the shores of Bering Sea; the flesh is said to be rank and unfit for food. The snow goose (*Oenanthe*) is a pure-white one, found throughout America, but rather rare in eastern parts. The so-called "tree ducks" (*Dendrocygna*) are tropical American geese occurring as far north as Texas in the summer. They are only about 20 inches long and are colored with various shades of yellowish and reddish brown. They make their nests in hollow trees, often some distance from water.

Among the notable geese of the Old World must be mentioned the graylag goose (*Anser anser*), which is thought to be the ancestral stock of the common domesticated goose. (See Colored Plate with WATER BIRDS.) It is found in central Europe and Asia and in north Africa. Another, common in Great Britain, is the bean goose (*Anser fabalis*), small and brownish, with a black "nail" on the beak. The spur-winged

goose (*Plectropterus gambensis*) is a purplish-black bird, with prominent spurs on the wings, found in Africa. In Australia there are two very remarkable geese—one (*Anseranas semipalmata*) with the feet little more than half webbed, and the other (*Cereopsis novaehollandiæ*), a scarcely aquatic bird, with long legs having the tibia partly bare and the bill small and membranous. Among the best known of the geese are the brants and barnacle geese (qq.v.). Consult D. G. Elliot, *Wild Fowl of the United States and British Possessions* (New York, 1898); and L. H. D. Shaw, *Wild Fowl* (ib., 1905). See Plate of NORTH AMERICAN WILD DUCKS in the article DUCK.

**Domestic Geese.** The domestication of the goose was very easy and doubtless began as soon as men began to remain in fixed settlements. They are among the animals figured on the oldest Egyptian and Asiatic monuments, and the Oriental breeds were no doubt derived from local wild species, especially the great Chinese swan, or "guinea" goose (*Cygnopsis cygnoides*), whose true home is in the valley of the Amur River. This is the largest of living geese, and wild and domesticated specimens are freely crossed to this day with other breeds. The basis of the domestic geese of Europe, however, is the graylag above described; and this kind was imported by the early colonists to America, where some admixture has taken place with local wild geese. Formerly the cultivation of geese was more extensive and important than at present. Great herds of geese were annually driven slowly from western Europe to Rome, where both flesh and feathers (down) were in great demand. Previous to the invention of metallic pens goose quills supplied all the pens used and formed a large article of trade now almost obsolete. In southern England goose culture was formerly far more extensive than at present, many thousands being driven to market every fall; and goose fattening in Holland and Germany is still a great industry, especially in the neighborhood of Strassburg. The long domestication of geese, however, has brought about remarkably little variation. As is pointed out by Darwin in his *Animals and Plants under Domestication*, the change has been little more than a considerable increase in size and fecundity, and a tendency to lose the brownish tints of the wild stock and become spotted with white or altogether white. The last feature has resulted not only from a preference for pure white which has prevailed ever since the time of the Romans, but from the former cruel practice of plucking geese alive, the new feather produced by the injured skin being usually white.

The standard breeds commonly raised in the United States are gray Toulouse, white Embden, gray African, brown Chinese, white Chinese, gray Wild, and colored Egyptian. A number of crossbred geese have also given good results. In general Toulouse geese are more compact in form than are other breeds and for this reason are preferred by many. The head is rather large and short and the bill comparatively short. The neck is carried well up and is of medium length. The breast is broad and deep. The body of the Toulouse goose is moderate in length, broad, deep, and compact. In birds of good condition the belly almost touches the ground. The wings are large and strong, the tail comparatively short, the thighs and shanks stout. In color the plumage is gray. The standard weight of



the adult gander is 20 pounds; adult goose, 20; young gander, 18; and young goose, 15 pounds. They are termed Christmas geese, since they mature later than others and are in season at the holiday time. They are fairly good layers, averaging 40 eggs in a season. See Colored Plate of Ducks.

White Embden geese are beautiful birds of large size, tall and erect carriage, snow-white plumage, and are about as heavy as the gray Toulouse goose. They originally came from Embden in Westphalia and have been bred in the United States for many years. They are considered a very satisfactory breed to raise. Gray African geese are by many considered the most profitable of all. They grow very rapidly and are ready for market in 10 weeks, weighing at that age between 8 and 10 pounds. According to standard weights they are as heavy as Toulouse and Embden, but heavier specimens are not uncommon.

The brown and white Chinese geese are smaller than those previously mentioned, and probably for this reason less popular. The domesticated gray wild geese are satisfactory and are generally bred throughout the United States. They are very highly prized for table purposes, are good layers, hardy, and easy to raise. The standard weight of the adult gander is 16 pounds; adult goose, 14 pounds; young gander, 12 pounds; and young goose, 10 pounds.

The colored Egyptian geese are purely ornamental, being seldom bred for other purposes than the showroom. They are sometimes called Nile geese. They are tall and slender. The color of the head is black and gray; the bill is purple or bluish red, and the eyes orange. The neck and back are gray and black; the centre of the breast is chestnut, with the other part gray. The upper parts of the plumage of the body are gray and black, and the under parts are a pale yellow, penciled with black.

**Breeding.** Geese are long-lived birds, some having been known to attain the age of 40 years. Birds 15 and 20 years old are not uncommon. Mature geese, at least two years old, should always be used for breeding. Breeding stock should be pastured in the fall and later fed on grain with some beef scraps. Ten per cent of the ration should be green feed, stewed clover and cooked vegetables. The eggs may be hatched by hens or by geese. When goslings are four or five days old, they are able to take care of themselves, but should always be cooped at night. The first food of goslings is grass fed as sod, and a little corn meal sometimes mixed with a little sand and charcoal. Very soon they may be fed a mixture of ground grains, grass, and vegetable food. When young geese are fattened, they should be placed in a rather small pen, so that they may not exercise too much, and should be fed three times a day a mixture of corn meal and beef scraps. They should be kept as quiet as possible. At 10 weeks of age, or when the tips of the wings reach the tail, they should be ready for market. Geese require a wider range than do ducks and, unlike the latter, will not do well unless they have access to water.

**Economic Uses.** Geese are valuable for their feathers, quills, eggs, and as food. The flesh is most commonly roasted. It contains on an average some 18 per cent refuse (waste, bones, etc.) and 32 per cent edible portion. The edible portion has, on an average, the following percentage composition: water, 46.7; protein, 16.3;

fat, 36.2; and ash, 0.8. Goose livers are esteemed a delicacy. The liver, morbidly enlarged by excessive feeding combined with lack of exercise, is used for making a delicately seasoned food called *pâté de foie gras*, for the manufacture of which Strassburg is especially famous. In Germany the breast is pickled and smoked under the name of Pomeranian goose breast. Goose fat is used to a large extent for culinary purposes, especially by Mohammedans and Jews. Consult Howard, "Ducks and Geese," in *United States Department of Agriculture, Farmers' Bulletin No. 64* (Washington, 1897).

**GOOSE, TAILOR'S.** A name applied to the smoothing iron used by tailors and supposed to have been given on account of the shape of the handle, which somewhat resembles the neck of a goose.

**GOOSE BARNACLE.** See BARNACLE.

**GOOSEBERRY**, *gōōz'bēr-ri* or *gōōs'*. The fruit of a prickly shrub of the genus *Ribes*, family Saxifragaceae. The genus is common throughout the north temperate zone, being represented by numerous species in America, Europe, and Asia, the great majority of which belong to North America. Of all these only four or five species have attained prominence in cultivation. The currant (q.v.) (*Ribes rubrum*) is one of the most important representatives of the genus and carries its distribution into the Orient. In the gooseberry, however, we find a very popular shrub in both the New and the Old World; it is especially prized in England, where it has attained its highest perfection, and where it has been in cultivation from the sixteenth century. Since it occurs only sparingly in southern Europe, where the grape thrives so well, it is little wonder that the gooseberry was neglected by the Greeks and Romans, even if they were familiar with it. The European gooseberry (*Ribes grossularia*) is in its natural state a strong-growing upright shrub with very formidable spines upon the branches and a hairy, more or less spiny, fruit. It is the progenitor of all the mammoth-fruited



FRUITING TWIG OF GOOSEBERRY.

varieties which have caused so much emulation among the gardeners of England, who have produced fruits weighing as much as 30 pennyweights; the unimproved fruits hardly average four pennyweights in weight. Varieties of this species were brought to America by the early pioneers, but the climate was uncongenial, and they suffered from disease and soon perished. Not until the middle of the nineteenth century could America claim to have a cultivated goose-



berry, and then only a seedling of one of the wild forms, *Ribes oxycanthoides*, common throughout the country. This was Houghton's seedling, which, however, is not the most common wild species even at its place of origin (Massachusetts). It was soon followed by one of its own progeny, Downing's seedling, or Downing. The popularity and universal cultivation of these two, which are still in the lead, is due largely to their ability to resist mildew. With the advent of spraying to check plant diseases a new era opened for European gooseberries in America; and since 1890 the English varieties have been planted with more assurance of success. There are now numerous hybrids of the European with native species, which promise to combine the resistant characters of the latter with the desirable size, color, and form of the former.

The gooseberry is easily propagated by means of suckers, cuttings, and layers. Cuttings are most frequently employed, as they grow readily and give a well-formed plant. The gooseberry thrives on all good arable soils and demands the same treatment as the currant. It is usually planted 3 by 6 feet apart in field culture, kept free from weeds, and sprayed with an arsenical poison early in the season to protect it from the worm which is as fond of it as it is of the currant. If the English varieties are grown, the poison must be supplemented with a fungicide. The fruits of the gooseberry are used extensively for jelly, jam, marmalade, etc., both in England and in America. The ripe fruits are also used to some extent in the manufacture of wines and vinegar.

Besides the two species above mentioned, the following species, being ornamental, should receive more attention than they do from horticulturists: the snow-flowered gooseberry (*Ribes niveum*), a native of the northwestern coast of America, is remarkable for its beautiful white pendulous flowers and its acid berries, which in size and color resemble black currants and which make delicious pies. *Ribes speciosum* is ornamental in pleasure grounds and is remarkable for its shining leaves, as well as for its flowers having four stamens, instead of five, as in other species, and for the great length of the filaments. *Ribes saxatile*, a native of Siberia, and other species, forming a subgenus called *Botrycarpum*, have a character somewhat intermediate between currants and gooseberries, being prickly shrubs, but having their flowers in racemes. *Ribes saxatile* has small, smooth, globose, dark-purple berries, like currants. Consult Card, *Bush Fruits* (New York, 1898).

**GOOSEBERRY, INSECTS INJURIOUS TO THE.** The gooseberry is injuriously attacked by several borers, etc., harmful to currants. (See CURRANT INSECTS.) Two caterpillars, however, are especially harmful. The most prominent one in the Old World is the magpie moth (*Abraxas grossulariata*), closely related to the cankerworm, whose caterpillar is the worst enemy of the gooseberry in Europe. In the United States the most damage is done by the gooseberry fruitworm (*Dakruma convolutella*), the larva of a pyralid moth about an inch across the wings, which are "pale gray crossed near the base by a dark diffuse band which is divided by a whitish line." The eggs are laid by the female moths on the young fruit, one on each; and when the young hatch, they bore into the berry and feed on the pulp. The cater-

pillars are about an inch in length, pale green, with brownish heads. As they grow, they bind several berries together with silk. Finally they drop to the ground, form cocoons beneath the leaves, and spend the winter there in the pupa state, from which they emerge in the spring. The only practical and effective remedy seems to be to watch the bushes and pick off and destroy the reddish infected berries early in the season. The small clearwing (*Egeria tipuliforme*) is also harmful in some places.



GOOSEBERRY INSECTS

a, gooseberry moth (*Abraxas grossulariata*) and larva; b, currant borer, the clearwing (*Egeria tipuliforme*).

**GOOSE BIRD.** A gunner's local name in the United States for the Hudsonian godwit (q.v.).

**GOOSE FISH.** See ANGLER.

**GOOSE FLOWER.** See ARISTOLOCHIA.

**GOOSE FOOT.** See CHENOPODIUM.

**GOOSE GRASS, or LEAVERS** (*Galium aparine*). A coarse-stemmed annual species of bedstraw with whorls of six to eight leaves. The hispid stems, leaves, and fruit cling to clothing and to animals. A somewhat common species is *Galium tricornis*, introduced from Europe into a number of places in the United States. There are about 50 species in the United States, none of which are of much importance except as weeds. The name is also applied to some true grasses. See ELEusine; BEDSTRAW.

**GOOSE HAWK.** See GOSHAWK.

**GOO'TOO** (Jamaica negro). A name in Jamaica for various small globe-fishes (q.v.).

**G. O. P.** (GRAND OLD PARTY). A popular name for the Republican party (q.v.).

**GO'PHER.** A name of somewhat indefinite significance. It is a corruption of the French word *gauffre*, a honeycomb, applied by French settlers in America to burrowing animals which "honeycomb" the soil.

1. Any of several American rodents, belonging to two distinct families, the Geomyidae and the Sciuridae, subfamily *Spermophilinae*. The true gophers belong to the first-mentioned family, the *spermophiles* being more properly ground squirrels (q.v.). The Geomyidae are known as pouched rats, or pocket gophers. They are characterized by very large external cheek pouches which are lined with fur. These do not communicate with the mouth, but open beside it. In some species they run along the whole side of the neck as far back as the shoulders. These pouches seem to be used largely for carrying food. The front feet have large claws and are otherwise fitted for digging. The tail is short, and the ears are small. There are only two genera—*Geomys*, with perhaps half a dozen species, and *Thomomys*, with four or five smaller species. All of the pouched rats are confined to the western half of North America, except two species of *Geomys*, which occur in the Gulf

States, and they range from Central America northward to British Columbia. The most common species (*Geomys bursarius*) is found in Canada, Missouri, Illinois, Iowa, Texas, Mexico, and the Gulf States, but not north of the Saskatchewan River. It is about 9 inches long, with an almost hairless tail about 2 inches long, and weighs about 13 ounces. Its legs are short; forefeet strong and well adapted for burrowing, having five claws, the three middle ones very large and long. The claws on the hind feet are small, but the two middle ones longer than the others, the interior one being almost rudimentary. It has 20 teeth—8 upper and 8 lower molars, and 4 incisors, which are very strong, especially the lower pair, which are much stronger than the upper. The ears are very small. The animal is reddish brown on the back and sides, ashy beneath, and has white feet. It burrows in sandy soils, throwing up the earth in little mounds, and its work is surprisingly rapid and extensive. It subsists on grass, roots, nuts, buds, and farm vegetables. The roots of trees often suffer severely from its attacks. The pouches which cover the side of the head are capable of being so distended as to enable the animal to carry a considerable load of provisions. The true Southern gopher, or Georgia hamster (*Geomys tuza*), is a larger animal, found in Alabama, Georgia, and Florida. By a strange misapplication of names the gophers of the Southern States are often called "salamanders," although the latter word is almost universally applied to the tailed amphibians, and its use should properly be confined to that group. On the Pacific coast there are several kinds of gophers. Some are  $6\frac{1}{2}$  inches long, with a tail nearly 3 inches; cheek pouches large, resembling the thumb of a glove, hanging down by the side of the head. When in the act of emptying its pouches, the animal sits on its hams, like a marmot or squirrel, and squeezes the sacks against its breast with its chin and forepaws. All those not inhabiting warm climates hibernate. A familiar species in the Northwest is the camass rat (*Thomomys talpoides*).

Similar animals inhabit the plains of other parts of the world, as South Africa, Russia, Tartary, and India. Everywhere that civilization has caused a lessening of natural enemies, such as weasels, badgers, skunks, foxes, wolves, hawks, owls, serpents, and the like, these animals have increased to the proportions of a pest and must be combated by poison, by flooding their burrows, suffocating with sulphur fumes, or similar means; in view of which such native carnivorous animals and birds as the coyote, badger, skunk, ferret, and all the hawks and owls should be preserved to the limits of toleration as assistants in keeping down these and other harmful rodents, such as the mice. See accompanying Plate and article POCKET GOPHER for illustrations of skull, face, and claws. Consult: Coues, *Geomys and Thomomys* (Washington, 1875); Merriam, *Monographic Revision of the Pocket Gophers* (Washington, 1895); Herrick, *The Mammals of Minnesota* (Minneapolis, 1892); Seton, *Life-Histories of Northern Animals* (New York, 1909).

2. A tortoise. See GOPHER TORTOISE.

3. A serpent. See GOPHER SNAKE.

**GOPHER SNAKE** (so called because it burrows like a gopher), or INDIGO SNAKE. A large colubrine serpent (*Compsosoma*, or *Spilotes*, co-

*rais couperi*) of the southern United States, 10 feet in length, black, with reddish markings about the mouth and forward part of the belly. It is regarded by the negroes as a mortal enemy of the rattlesnake (see KING SNAKE) and is rarely molested by them. This variety passes into a variety (*melanurus*) of Mexico and Central America, and that into the typical *Compsosoma corais* of South America, which is light brown, with a black oblique stripe on each side of the neck.

**GOPHER STATE.** Minnesota. See STATES, POPULAR NAMES OF.

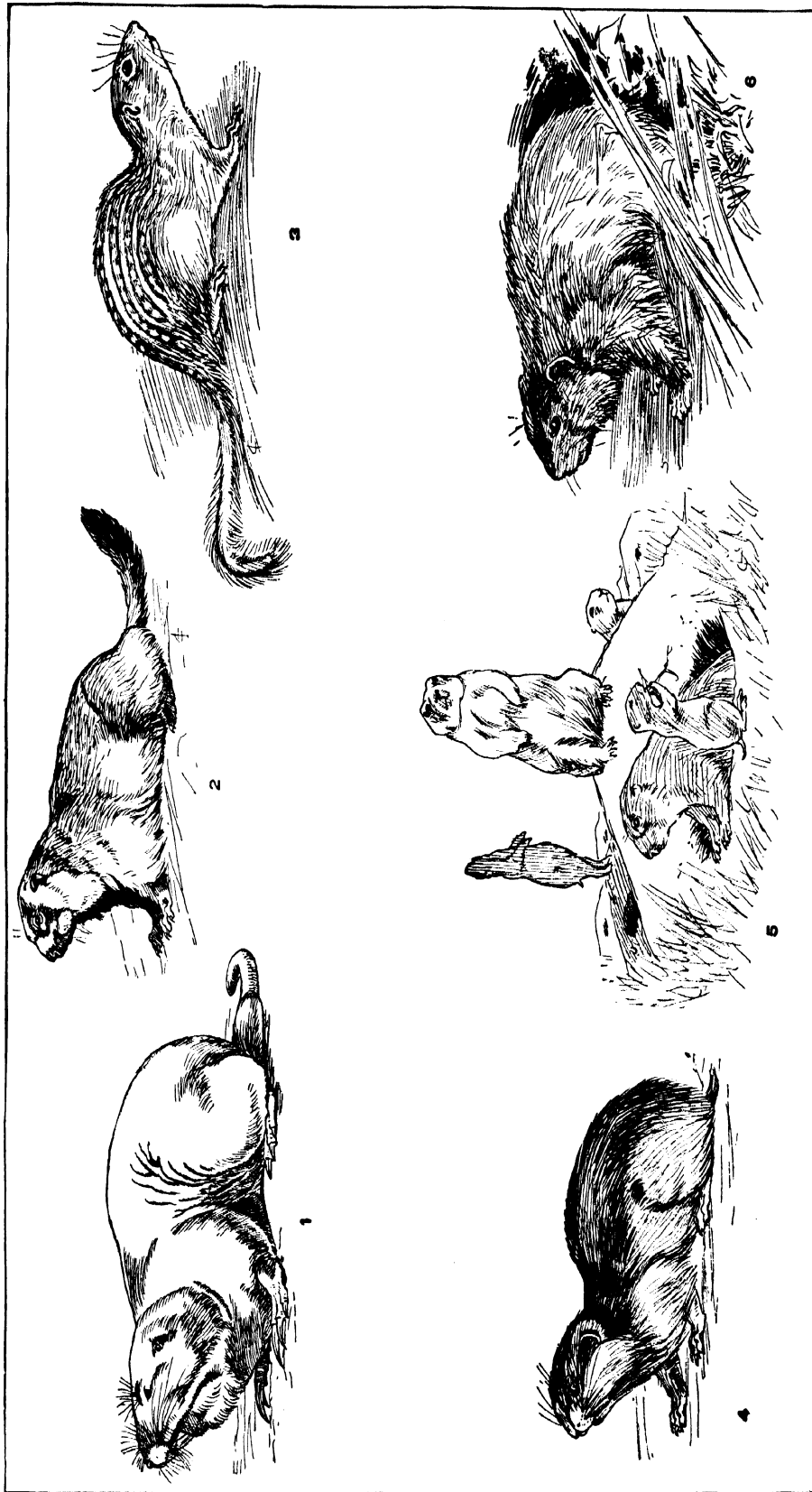
**GOPHER TORTOISE.** A turtle (*Xerobates* or *Testudo*, *polyphemus*) of the sandy coast districts of the southern United States. The shell, brown and black above and yellow below, measures 15 inches in length, the females being larger than the males. These tortoises are strong animals, burrowing deeply into the soil, where they pass the hot part of the day in pairs and hibernate in winter, and whence they come out at night in search of vegetable food. They are numerous and somewhat gregarious, especially in Florida, and do much damage in gardens and among root crops. The rural negroes seek them for food and also search for their buried eggs, which are as large as the eggs of a pigeon and five in number. The animal is thus an important food resource in Florida, where it is captured largely in pit traps. Other similar species inhabit the southwestern Territories and northern Mexico.

**GOPHER WOOD.** The wood of which Noah's ark was made (Gen. vi. 14). The word occurs only in this passage, is not found in the Semitic languages other than Hebrew, and its true meaning is not known. It has been conjectured to be akin to the Hebrew *kopher* (bitumen) or *gophrith* (pitch), to be a resinous wood like the cedar or the cypress, or to correspond to the Assyrian *giparu* (reed). If the last meaning is accepted, it is well to remember that the kufa now in use on the rivers and canals of Babylonia are made of willow branches, palm leaves etc., closely interwoven like basketwork, with a coat of bitumen on the inside.

**GÖPPERT**, göp'pért, HEINRICH ROBERT (1800–84). A German paleontologist and botanist, born at Sprottau and educated at Breslau and Berlin. He was teacher at the Medico-Chirurgical Institute in 1827–30 and in 1831 became professor of botany at the University of Breslau. During the last 31 years of his life he was director of the botanical garden of Breslau. Besides his important compilation and classification of all fossilized plants known before 1850 in Brown's *Index Palæontologicus* (1848–50), he wrote a very large number of works, chiefly on vegetable physiology and phyto-paleontology. Among these are: *Die fossilen Koniferen verglichen mit denen der Jetztwelt*, with 58 plates (1850); *Skizzen zur Kenntnis der Urwälder Böhmens und Schlesiens* (1868); *Ueber die fossile Flora der silurischen, devonischen, und unteren Kohlenformation* (1860); *Die Flora des Bernsteins* (1883).

**GÖPPINGEN**, göp'ping-en. A town of the Kingdom of Württemberg, Germany, situated, 1030 feet above sea level, on the Fils, 26 miles by rail from Stuttgart (Map: Germany, C 4). It has an old castle, built in the sixteenth century. The town is an important industrial centre with manufactures of cloth, leather,

# GOPHERS LEMMINGS AND MARMOTS



1. POUCHED GOPHER (*Geomys bursarius*).
2. ALPINE MARMOT (*Marmota marmota*).
3. STRIPED GROUND SQUIRREL or GOPHER (*Spermophilus tridecemlineatus*).
4. LEMMING (*Lemmus lemmus*).
5. PRAIRIE DOG (*Cynomys ludovicianus*).
6. WOODCHUCK (*Arctomys monax*).



enameled ware, toys, agricultural machinery, wire netting, shoes, paper, hats, gelatine, chemicals, bricks, textiles, and glue. Pop., 1900, 19,384; 1910, 22,373.

**GOPURA**, or **GOPURAM** (Skt. *gōpura*, a city gate). In Hindu architecture, a tower-like structure erected over the gateway of a temple. The term is used almost exclusively of the Dravidian temple gateways of southern India (see **DRAVIDIAN ARCHITECTURE**). These sustain lofty pylons built in successively re-treating stories decorated with an extraordinary complexity of architectural embellishments and figure sculpture. They have no utilitarian function. Some of the great temples have not only a gopura over each of the four gates to the outer wall, but gopuras also over the gateways of successive inner enclosures. That at Srirangam has twelve; that at Tiruvaleer nine. The unfinished gopura in front of the *choultrie* of Tirumulla Nayab at Madura measures 107 by 174 feet on the ground; the gateway is 57 feet high, and the structure, if completed, would have been probably over 300 feet high. The *gopuras* should not be confounded with the pagodas, *sikhras* and *vimanas*, which are tower-like shrines or parts of the temple proper. See **INDIAN ART, Architecture**. Consult Fergusson, *Indian and Eastern Architecture* (London, 1891).

**GORAKHPUR**, *gō'rūk-pōōr'*. A division of the United Provinces of Agra and Oudh, British India, bounded on the north by Nepal and on the south by the Gogra River. Area of division, 9543 square miles. Pop., 1891, 6,508,800; 1911, 6,524,419. It comprises the three districts of Gorakhpur, Basti, and Azangarh, and lies immediately south of the lower Himalayan slopes. It is intersected by numerous rivers and lakes well stocked with fish. In the north and centre dense forests abound, and the whole country presents a verdant appearance. The principal rivers are the Rapti, the Gogra, and the Great and Little Gandak. The tiger is found in the north, and many other wild animals abound. The chief productions are cotton, rice, bajra, joah, moth, etc. Capital, Gorakhpur (q.v.). Gautama Buddha, the founder of Buddhism, died within the District of Gorakhpur, and it became the headquarters of the new creed. The district formed part of the territory ceded by Oudh to the British under the Treaty of 1801. During the mutiny of 1857 it was lost for a short time, but under the friendly Gurkhas the rebels were driven out, and the whole district once more passed under British rule.

**GORAKHPUR**. The capital of a district and division of the United Provinces of Agra and Oudh, British India, on the Rapti River, 100 miles northeast of Benares (Map: India, E 3). Its principal edifice is a beautiful mosque, built in the seventeenth century. A considerable river transit trade in grain and timber is carried on. Gorakhpur was formerly an important military station, but the troops have been moved, and the large cantonment on the west of the city is abandoned. Pop., 1901, 64,148; 1911, 56,892.

**GORAL** (East Indian). A goat antelope (q.v.) of the genus *Cemas*, inhabiting the mountain tops of Central Asia. Three species are separated by zoölogists, but those of Tibet and Mongolia are so little known that they may prove only varieties of Himalayan goral (*Cemas goral*). This antelope-like animal stands only 27 inches high and is grayish brown, with a

dark stripe along the back and another down the foreleg, and a curious white ring around the eye; the forehead, nose, and tail are black. Both sexes have short black horns curving backward and ringed near the base. They wander in small bands about the edge of the highest forest and are exceedingly vigilant and agile, so that goral stalking is a laborious and skillful as well as delightful pursuit for the sportsman. See **SEBOW**, and **Plate of GOAT ANTELOPES**.

**GORAMI**, *gō'rā-mī*. See **GOURAMI**.

**GORBODUC**. A legendary King of Britain, who is mentioned in the early chronicles, and whose tragic fate, together with that of his sons, forms the plot of the first English tragedy. The play was written by Thomas Norton and Thomas Sackville, was acted in 1561, and was printed in 1565. It has been highly praised by Sidney and Pope, but is rather too sanguinary for modern audiences. It goes by the name of its hero, who has divided his possessions between his two sons, Ferrex and Porrex. The sons quarrel, and one is slain; the survivor is slain by his mother, who in turn is killed with her husband by an indignant populace.

**GORBUSCHA**, *gōr-bōō'shā*. The humpbacked salmon (*Oncorhynchus gorbuscha*). See **SALMON**; **HUMPBACKED SALMON**.

**GORCOMIUM**. See **GORKUM**.

**GOR'CUM**. See **GORKUM**.

**GOR'DAN**, **PAUL ALBERT** (1837-1912). A German mathematician, born at Breslau. He studied at various German universities and in 1862 received his doctor's degree from the University of Berlin. He became a lecturer at the University of Giessen in 1863 and professor in 1865. After 1875 he held a professorship at the University of Erlangen. Gordan was one of the chief workers in the theory of invariants. He coöperated with Alfred Clebsch in much of his work and was a collaborator on the *Mathematische Annalen* after 1873. His proof of the finiteness of the invariant system of binary forms (first published in 1869) was a very important contribution to the upbuilding of the theory of modern algebra. His publications include: *Ueber die Transformation der Theta Funktionen* (1863); *Theorie der Abel'schen Funktionen*, with Clebsch (1866); *Ueber das Formensystem binärer Formen* (1875); *Vorlesungen über invarianten Theorie* (2 parts, 1885-87); and some 80 papers in mathematical journals.

**GOR'DIAN**. The English form of the name of three Roman emperors. See **GORDIANUS**.

**GOR'DIAN KNOT** (Lat. *Gordius nodus*). The traditional origin of this famous knot was as follows: Gordius, a Phrygian peasant, was once plowing in his fields, when an eagle settled on his yoke of oxen. Surprised at so wonderful a phenomenon, he sought an explanation of it and was informed by a prophetess of Telmessus that he should offer sacrifice to Zeus. He did so, and out of gratitude for the kindness shown to him married the prophetess, by whom he had a son, the famous Midas. Somewhat later, in consequence of factional quarrels, the Phrygians consulted an oracle concerning the choice of a king. In reply they were ordered to choose as king whoever should first come to them riding in a car. As Gordius and his family came to the assembly while the reply was under discussion, he was at once chosen king, or, according to another version, his son Midas became ruler. Gordius dedicated his car and yoke to

Zeus, in the acropolis of Gordium (a city named after himself, in Phrygia, on the road between Pessinus and Ancyra, near the river Sangarius); the knot of the yoke was tied in so skillful a manner that an oracle declared that whoever should unloose it would be ruler of all Asia. When Alexander the Great came to Gordium, he cut the knot in two with his sword and applied the prophecy to himself.

**GOR'DIANUS.** The name of three Roman emperors, father, son, and grandson.—The first, **MARCUS ANTONIUS GORDIANUS SEMPRONIUS**, surnamed **AFRICANUS** (c.158–238 A.D.), was descended on the father's side from the famous family of the Gracchi. He was remarkable for his attachment to literary pursuits. After being *ædile*, in which capacity he celebrated the gladiatorial sports with great magnificence, he twice filled the office of consul—first as the colleague of Caracalla in 213 A.D., and later as the colleague of Alexander Severus. Soon afterward Alexander Severus appointed him proconsul of Africa, where he gained the affection and esteem of the people. The tyranny and injustice of the Emperor Maximinus having at length excited a rebellion against his authority in Africa, the Imperial procurator there was murdered by a band of nobles who had formed a conspiracy against him on account of his cruelty. Gordianus, now in his eightieth year, was proclaimed Emperor after having vainly refused the dangerous honor (March 16, 238 A.D.). He received the title of Africanus, and his son was associated with him in the exercise of Imperial authority. The Roman Senate acknowledged both and proclaimed Maximinus, then absent in Pannonia, an enemy to his country. The younger Gordianus, however, was defeated and slain in battle by Capellianus, Governor of Numidia, before Carthage, and his father in an agony of grief put an end to his own existence, having been Emperor for little more than a month. In personal appearance the elder Gordianus is said to have greatly resembled Augustus.—**MARCUS ANTONIUS GORDIANUS** (192–238), commonly called **GORDIANUS PRUS**, Emperor 238–244 A.D., grandson of the older Gordianus, was raised to the dignity of Cæsar along with Pupienus Maximus and Balbinus, who were also proclaimed emperors in opposition to Maximinus; and in the same year, after Pupienus, Balbinus, and Maximinus had fallen by the hands of their own soldiers, Gordianus was elevated by the prætorian guards to the rank of Augustus. Assisted by his father-in-law, Misi-theus, a man distinguished for his wisdom, virtue, and courage, whom he made prefect of the prætorians, he marched, in the year 242, into Asia, against the Persians, who under Shapur (Sapor) had taken possession of Mesopotamia and had advanced into Syria. Antioch, which was threatened by them, was relieved by Gordianus, the Persians were obliged to withdraw from Syria beyond the Euphrates, and Gordianus was just about to march into their country when Misi-theus died. Philip the Arabian, who succeeded Misi-theus, stirred up dissatisfaction in the army against Gordianus by treachery and finally goaded on the soldiery to assassinate the Emperor, 244 A.D.

**GORDIN**, gôr'dyên, **JACOB M.** (1853–1909). A Jewish playwright and journalist, born in the Government of Poltava, Russia. He was privately educated and after a number of years spent in teaching began to write short stories

and general articles for newspapers in St. Petersburg and Odessa. From 1886 to 1890 he was the editor of various publications at Odessa and Yelizavetgrad. In 1879 he founded at Yelizavetgrad the Society of Spiritual Brethren of the Bible, whose aim was to reconstruct religion upon the sole basis of practical ethics, to the exclusion of all rites and ceremonies. In 1890 the society was suppressed by the Russian government, and Gordin came to New York, where he began almost immediately to write for the Yiddish stage, his first play, *Siberia*, appearing in November, 1891. Within the next 15 years he had produced about 60 plays, varying greatly in quality, among them many adaptations and translations, dealing for the most part with Jewish life in Russia and America. His adaptations are such in the sense only that the general outline of their plot is borrowed; the details of the action, the character drawing, and the underlying meaning of the play are most often original. *Gott, Mensch und Teufel*, one of his best plays, is the Job or Faust motive worked out in modern Jewish life, and in the same category are *Der jüdische König Lear*, *Die jüdische Sappho*, and *Kreutzer Sonata*. The last was produced in an English version in 1905–06. His plays are robustly realistic, but the ethical import is prominent. Others of his successful dramatic works are: *Muric Efroth*; *Der wilde Mensch*; *Die Schechta* (The Sacrifice); *Die Schb'uo* (The Vow); *Medea*; *Schlome Chacham*, *Der russische Jude in Amerika*. Consult Hapgood, *The Spirit of the Ghetto* (New York, 1902).

**GOR'DIUM.** See **GORDIAN KNOT**.

**GOR'DIUS** (Lat., Gordian, sc. *nodus*, knot; so called from the intricate knots into which the animals twist). The type genus of the Gordioidæ, second order of Nematoda (q.v.), including those nematodes in which the body cavity is lined by a distinct epithelium. See **HAIR-WORM**.

**GORDIUS.** See **GORDIAN KNOT**.

**GOR'DON, THE FAMILY OF.** A famous Scottish family. In 1305 Sir ADAM OF GORDON was a partisan of Edward I in his struggle for the Scottish throne. He was named joint justiciar of Lothian and was one of the representatives of Scotland in the Parliament of Westminster. Nevertheless, he was pardoned by Robert Bruce and given the lordship of Strathbogie, where the chief seat of the family henceforth lay. His descendant, Sir ADAM, fell at the battle of Homildon Hill, in 1402, and with him the direct male line ended. The name "Gordon" was, however, transmitted by his two half brothers to a wide circle of gentry in Mar, Buchan, and Strathbogie.

**ELIZABETH OF GORDON**, the only daughter and heiress of Sir Adam, married Alexander Seton, who afterward was given the title of Lord Gordon. Her son ALEXANDER assumed the family name of Gordon and was made Earl of Huntly in 1449 and Lord of Badenoch soon afterward. By marriage he acquired large possessions in Aberdeenshire. Her son GEORGE, second Earl of Huntly, married Annabella, daughter of James I, and was Chancellor of Scotland from 1498 to 1501. His son ALEXANDER commanded the left wing of the Scottish army at Flodden Field. The landed possessions of the family were greatly increased by this royal marriage, especially in Banffshire and Inverness-shire. GEORGE, fourth Earl of Huntly, acquired the earldom of Moray,

and held the offices of Lieutenant of the North and Chancellor of the Realm. Alarmed at his power, the crown deprived him of Moray. The Earl rebelled, and lost his life by a wound in 1562. His grandson GEORGE, the fifth Earl (see HUNTLY, GEORGE GORDON), headed the Catholic party in Scotland and defeated at Glenlivet a royal army sent against him in 1594. Nevertheless, he obtained a pardon and was made Marquis of Huntly. GEORGE, his successor, fought for Charles I in the Civil War and was beheaded at Edinburgh in 1649. His grandson, GEORGE, first Duke of Gordon (1684), held Edinburgh Castle for James II in the revolution of 1688. His son was the last Catholic chief of the race, while his great-grandson, LORD GEORGE GORDON (q.v.), was leader of the Gordon Riots of 1780 in London, directed against the Catholics. In 1836 the title became extinct, but it was revived in 1876 for the benefit of the Duke of Richmond.

Descendants of the first Marquis of Huntly became viscounts of Melgund and of Aboyne and finally inherited the marquissate of Huntly, which they still hold. Other members of the family became earls of Sutherland. The lords of Lochinvar, famous in poetry and song, were Gordons. One of them, WILLIAM, sixth Viscount of Kenmure, was beheaded in 1716 for his prominent part in the Jacobite rising. In 1682 SIR GEORGE GORDON of Haddo, Lord Chancellor of Scotland, was made Earl of Aberdeen. Other members of the family were Lord Byron, whose mother was a Gordon, and CHARLES GEORGE GORDON, the hero of Khartum.

(Consult: Douglas, *The Baronage of Scotland* (Edinburgh, 1813); W. Gordon, *The History of the Ancient, Noble, and Illustrious House of Gordon* (ib., 1726-27); *The House of Gordon*, ed. by J. M. Bulloch (Aberdeen, 1903-12); Bulloch, *The Families of Gordon of Invergordon, Nechall, also Ardoch, Ross-shire and Carroll, Sutherland* (ib., 1906); id., *The First Duke of Gordon* (ib., 1909), *The Gay Gordons* (London, 1908).

**GORDON, ADAM LINDSAY** (1833-70). An Australian poet. He was born at Fayal in the Azores and was educated at Cheltenham College, and at Merton College, Oxford. In 1853 he emigrated to South Australia, where he became a trooper in the mounted police and later a horse breaker. In 1865 he was elected a member of the House Assembly for the District of Victoria. He became known as an expert steeplechase rider, opened a livery stable at Ballarat, Victoria, in 1867, and in 1869 moved to Melbourne. His writings were little known during his life, but after his death—he committed suicide—his reputation increased until he became the most popular of Australian poets. His volumes of verse include: *Sea Spray and Smoke Drift* (1867); *Ashtaroth: A Dramatic Lyric* (1867); *Bush Ballads and Galloping Rhymes* (1870). Consult Marcus Clarke's biographical sketch in his edition of Gordon's poems (1880), and also J. H. Ross, *The Laureate of the Centaurs: A Memoir of Adam Lindsay Gordon* (1888). His poems, ed. by Douglas Sladen, appeared in London in 1912. See AUSTRALIAN LITERATURE.

**GORDON, CHARLES GEORGE** (1833-85). An English soldier, familiarly known as "Chinese Gordon" and "Gordon Pasha." The son of Henry William Gordon, lieutenant general of artillery, he was born at Woolwich, Jan. 28, 1833. He was educated at Taunton, and entered

the Royal Military Academy at Woolwich in 1848. Obtaining a lieutenant's commission in 1852, he served through the Crimean War with distinction. From 1856 to 1858 he was employed in surveying and settling the Russo-Turkish frontier in Asia and acquired an intimate knowledge of the people and the districts he visited. He was promoted captain, 1859, in 1860 joined the Anglo-French forces in China and was present at the capture of Peking. He remained at Tien-tsin in command of the royal engineers; he added to the geographical knowledge of China by several expeditions to the unknown interior, in 1862 became major, and in 1863 was appointed commander of the "Ever Victorious Army," which suppressed the formidable Taiping rebellion and opened up the rich provinces and cities of the silk districts. He refused the large money rewards offered him by the Chinese Emperor, who bestowed upon him the yellow jacket and peacock's feather of a mandarin of the first class, with the gold medal and title of Ti Tu, the highest Chinese military rank. In 1864 he received his brevet as lieutenant colonel, and on his return to England was made a C.B. From 1865 to 1871 he commanded at Gravesend the royal engineers, who were employed in constructing forts for the defense of the Thames, and was distinguished for his charitable work among the sick and poor. From 1871 to 1873 he represented England in the International Danube Commission at Galatz. In 1874 he was sent by Ismail Pasha to establish the authority of Egypt in the upper Nile basin, and was appointed Governor of the Equatorial Provinces. Subsequently he was created a pasha, and in February, 1877, the Khedive appointed him Governor of the Sudan. His administration was marked by wonderful energy and activity in establishing communication between widely separated districts, in the development of the natural resources of the country, and in suppressing rebellion and slavery. The deposition of Ismail in 1879 led to his resignation. In 1880 he accompanied the Marquis of Ripon to India as his private secretary, but, finding himself unsuited for the post, at once resigned, and on the invitation of Sir Robert Hart visited China to advise the government in connection with its strained relations with Russia.

In 1881-82 he commanded the royal engineers in Mauritius, where he attained the rank of major general. From March to October, 1882, he was connected with the Cape government in an attempt to terminate the Basuto trouble, but resigned in indignation at the intrigues of Mr. Sauer, Secretary for Native Affairs. The year 1883 he spent in a long-desired visit to the Holy Land. He had undertaken a mission to the Congo for the King of the Belgians when the catastrophe to Hicks Pasha's army, which was overwhelmed by the forces of the Mahdi, made the Gladstone government insist on the Khedive's abandonment of the Sudan. Gordon was commissioned to effect the withdrawal of the scattered garrisons and the evacuation of the country. He arrived at Khartum in 1884 and received a warm welcome; but his first battle with the hostile Sudanese was unsuccessful, owing to the treachery of two pashas, whom he at once sentenced to death. The capture of Berber by the rebels cut Gordon's communications with Cairo, and he was beleaguered in Khartum. By vigorous personal effort he successfully repelled the besieging hordes for over 10 months, but on

Jan. 26, 1885, when a tardily dispatched British army of relief, under General Wolseley, had arrived within two days' march of the place, Khartum fell through the treachery of Ferig Pasha, and the heroic commander was slain. Gordon's writings include: *Reflections in Palestine* (1884); *Last Journal* (1885); *Letters to his Sister* (1888). Consult: Andrew Wilson, *Ever Victorious Army* (London, 1868); Hill, *Gordon in Central Africa* (ib., 1881); Hake, *The Story of Chinese Gordon* (ib., 1884-85); and the various *Lives* by Archibald Forbes (ib., 1884), by his brother, Sir Henry Gordon (ib., 1886); Sir W. F. Butler (ib., 1899); D. Boulger (ib., 1911); W. S. Blunt, *Gordon at Khartoum* (ib., 1911); and the books on *the Egyptian Sudan*, by Ohrwalder (trans., ib., 1892) and Slatin Pasha (trans., ib., 1896).

**GORDON, CHARLES WILLIAM** (1860- ). A Canadian author. He was born in the County of Glengarry, Ontario, graduated at Toronto University, and studied theology at Knox College. He was ordained to the Presbyterian ministry in 1890. In the same year he went as a missionary to the Canadian Northwest Territories, where he worked among the miners and lumbermen for three years, and afterward succeeded in securing the help of Presbyterian churches in Great Britain in furtherance of Canadian missions. In 1894 he was appointed pastor of St. Stephen's Presbyterian Church at Winnipeg. All his writings were published under the nom de plume of "Ralph Connor." Gordon was elected vice president of the Canadian Society of Authors, and a fellow of the Royal Society of Canada. In 1911 he was chairman of the board of arbitration in the British Columbia and Alberta mines dispute. His works, several of which created a sensation, include: *Beyond the Marshes* (1897); *Black Rock* (1898); *The Sky Pilot* (1899); *The Man from Glengarry* (1901); *Glengarry School Days* (1902); *The Swan Creek Blizzard* (1904); *The Prospector* (1904); *Breaking the Record* (1904); *The Doctor: A Tale of the Rockies* (1906); *The Angel and the Star*, sermons (1908); *The Life of the Late Rev. Dr. James Robertson* (1908); *The Dawn by Galilee* (1909); *The Foreigner* (1909); *The Recall of Love* (1910); *Corporal Cameron of the Northwest Mounted Police* (1912). Consult "English-Canadian Literature," by Thomas Guthrie Marquis, in *Canada and its Provinces*, vol. vi (Toronto, 1913-14).

**GORDON, DANIEL MINER** (1845- ). A Canadian educator. He was born in Pictou, Nova Scotia, and was educated at Glasgow and Berlin universities. Ordained to the Presbyterian ministry in 1866, he was minister of St. Paul's Church, Truro, Nova Scotia (1866-67); St. Andrew's Church, Ottawa, Ontario (1867-82); Knox Church, Winnipeg, Manitoba (1882-87); and St. Andrew's Church, Halifax (1887-94). In 1894-1902 he was professor of systematic theology in the Presbyterian College, Halifax; and in 1902 he became principal and vice chancellor of Queen's University, Kingston, Ontario. Long and actively interested in promoting the union of the Presbyterian churches in Canada, Gordon was a delegate to the General Assembly of the Church of Scotland in 1875, in 1906 was appointed a member of the committee on union of the Presbyterian, Methodist, and Congregational churches of Canada, was elected vice president of the Lord's Day Al-

liance, and in 1910 was a delegate to the World's Missionary Convention at Edinburgh. He published *Mountain and Prairie* (1880), the narrative of a journey made by him in 1879 from Victoria, British Columbia, to Winnipeg.

**GORDON, GEORGE, LORD** (1751-93). An English agitator whose name is connected with the "No Popery" riots in London in 1780. He was the third son of Cosmo George, third Duke of Gordon. He was born Dec. 26, 1751, and at an early age entered the navy, and rose to the rank of lieutenant, but quitted the service during the American War because Lord Sandwich refused him a ship. Elected in 1774 member of Parliament for Ludgershall, a pocket borough, he soon made himself conspicuous by his opposition to ministers and by the freedom with which he attacked all parties; but, though eccentric, he displayed considerable talent in debate and no little wit. When in 1778 a bill passed the Parliament for the relief of Roman Catholics from certain penalties and disabilities, the Protestant Association of London, among other societies, was formed for the purpose of procuring its repeal, and in November, 1779, Gordon was elected president. In June, 1780, he headed a mob of about 100,000 persons in a procession to the House of Commons to present a petition against the measure. Riots ensued in the city, lasting for several days, in the course of which many Catholic chapels and private dwelling houses, Newgate and other prisons, and the mansion of the Chief Justice, Lord Mansfield, were destroyed, and in the suppression of the disturbance by military force nearly 500 lives were lost. A vivid description of the riots will be found in Dickens's *Barnaby Rudge*. Gordon was tried for high treason, but acquitted. Thereafter he seemed insane. In 1786 he was excommunicated by the Archbishop of Canterbury for refusing to give evidence in a will case, and later he became a convert to Judaism. In 1787 he was convicted on two official informations—for a pamphlet reflecting on the laws and criminal justice of the country and for publishing a libel on Marie Antoinette, then Queen of France. While in prison at Newgate, he died of a fever on Nov. 1, 1793. In addition to the histories of England, consult: O'Beirne, *Considerations on the Late Disturbances, by a Consistent Whig* (London, 1780); Vincent, *A Plain and Succinct Narrative of the Riots in the Cities of London and Westminster and Borough of Southwark* (3d ed., ib., 1780); Watson, *Life of Lord George Gordon* (ib., 1795); Wemyss, *A Notable Woman and Other Sketches* (ib., 1803); Cobbett, *State Trials*, xxi; *Annual Register* for 1780, 1784, 1787.

**GORDON, GEORGE, fifth EARL OF HUNTLY.** See HUNTLY.

**GORDON, GEORGE ANGIER** (1853- ). An American Congregational clergyman, born in Aberdeenshire, Scotland. He came to America when but 18 years old and three years afterward entered the Bangor Theological Seminary, where he graduated in 1877. He preached for one year at Temple, Me., took a special course in Harvard College, and after his graduation in 1881 was for three years pastor at Greenwich, Conn., and in 1884 became pastor of the Old South Church in Boston. He was a university preacher at Harvard University from 1886 to 1890 and at Yale from 1888 to 1901. In 1897 he became an overseer of Harvard. In 1893 he received the degree of D.D. from Bow-



doin and from Yale, and the degree of S.T.D. in 1895 from Harvard and in 1903 from Columbia. His publications include: *The Witness to Immortality* (1893); *The Christ of To-Day* (1895); *Immortality and the New Theology* (1897); *The New Epoch for Faith* (1901); *Ultimate Conceptions of Faith* (1903); *Through Man to God* (1906); *Religion and Miracle* (1909; rev. ed., 1910); *Revelation and the Ideal* (1913).

**GORDON, GEORGE HAMILTON**, fourth EARL OF ABERDEEN. See ABERDEEN.

**GORDON, GEORGE HENRY** (1823-86). An American soldier. He was born in Charlestown, Mass., graduated at West Point in 1846, and served in the southern campaign in the Mexican War, earning the brevet of first lieutenant. In 1854 he resigned from the service, and from 1854 to 1861, after taking a course in the Harvard Law School, practiced law in Boston. On the outbreak of the Civil War in 1861 he organized and became colonel of the Second Massachusetts Volunteers. Largely in recognition of his skill and bravery in covering the retreat of General Banks's army from Strasburg to Winchester, Va., on May 24-25, 1862, he was promoted to be a brigadier general of volunteers in June, 1862, and served as such at Cedar Mountain, Chantilly, South Mountain, and Antietam. From March to June, 1865, he was in command of the Eastern District of Virginia, and on April 9, 1865, was brevetted major general of volunteers. On Aug. 24, 1865, he was mustered out of service and subsequently until his death practiced law in Boston, where for some time he also acted as collector of internal revenue for the Seventh Massachusetts District. He published: *History of the Second Massachusetts Regiment* (1876); *History of the Campaign of the Army of Virginia under Gen. John Pope from Cedar Mountain to Alexandria* (1880); *A War Diary of the Events of the War of the Great Rebellion, 1863-65* (1882); *Brook Farm to Cedar Mountain, 1861-62* (1883).

**GORDON, SIR JAMES ALEXANDER** (1782-1869). An English naval officer, born in Aberdeenshire. He entered the navy at the age of 11, served in the engagement off L'Orient in June, 1795, and in the battles of Cape St. Vincent and the Nile. In 1804 he was placed in command of the sloop *Raccoon*, subsequently participated in various actions in the West Indies, the Mediterranean, and the Adriatic, and particularly distinguished himself in the battle of Lissa, March 13, 1811, in which he commanded the frigate *Active*. In November, 1811, he lost a leg at the capture of the French frigate *La Pomone*. As commander of the *Sea Horse*, he joined Sir Alexander Cochrane in the Chesapeake in the fall of 1813 and subsequently commanded the squadron which, in August, 1814, entered the Potomac, reduced Fort Washington, and captured Alexandria, after destroying or capturing the vessels in the harbor. He also took part in the futile expeditions against New Orleans in 1814-15. Subsequently he was superintendent of Plymouth Hospital (1828-32), superintendent of Chatham Dockyard (1832-37), lieutenant governor of Greenwich Hospital (1840-53), and governor of that hospital from 1853 until his death (Jan. 8, 1869). He was made a vice admiral in 1848, admiral in 1855, and admiral of the fleet in 1868.

**GORDON, JOHN**. A Scottish soldier of fortune of the seventeenth century. He entered the Imperial army of Ferdinand II during the Thirty

Years' War and rose to the rank of lieutenant colonel and commandant of Eger. Upon hearing of the defection of Wallenstein, commander in chief of the Imperial forces, and the determination of that general to form an alliance with the Swedes, Gordon joined in the conspiracy with Butler and Leslie for the murder of Wallenstein and his most trusted adherents. In compensation for his services he received a considerable sum from the Imperial government. Gordon is one of the characters in Schiller's tragedy, *Wallenstein*.

**GORDON, JOHN BROWN** (1832-1904). An American soldier and politician. He was born in Upson Co., Ga., graduated at the State University in 1852, and followed the profession of law. In 1861 he entered the Confederate army as captain of infantry and rose to the grade of lieutenant general, being wounded five times. At the time of General Lee's surrender at Appomattox, General Gordon commanded one wing of the army. In 1868 he was the Democratic candidate for Governor of Georgia, but General Meade, military commander under the Reconstruction Act, declared his opponent, Rufus B. Bullock, elected. He defended his State in the Ku-Klux investigations, was elected to the United States Senate in 1873, reelected in 1879, and resigned in 1880. He was again elected in 1891, and was one of the leaders of the Democratic party. From 1887 to 1890 he was Governor of Georgia. He became well known as a lecturer on Civil War subjects, and for a number of years held the post of commander in chief of the United Confederate Veterans. He wrote *Reminiscences of the Civil War* (1905).

**GORDON, SIR JOHN CAMPBELL**, seventh EARL OF ABERDEEN. See ABERDEEN.

**GORDON, SIR JOHN WATSON** (1788-1864). A Scottish portrait painter. He was born at Edinburgh, the son of Capt. James Watson of the Royal Artillery, and afterward added Gordon to his family name. He studied for four years under John Graham at the Trustees' Academy and frequented the studio of his uncle and Sir Henry Raeburn. After the death of Raeburn he became the principal portrait painter in Scotland. In 1850 he succeeded Sir William Allan as president of the Royal Scottish Academy, was appointed limner to the Queen, and received knighthood. Gordon excelled in transferring to the canvas those lineaments of character which are conceived to be preëminently Scottish. Among his best-known works may be mentioned: "Sir Walter Scott" (1831); "Dr. Chalmers" (1837); "Duke of Buccleuch" (1842); "Lord Cockburn" (1842); "Thomas De Quincey" (1843, National Portrait Gallery, London); "Lord Robertson" (1846); "Principal Lee" (1847); "Professor Wilson" (1851); "Earl of Aberdeen" (1852); and the "Provost of Peterhead" (1853), which received a gold medal at the Paris Exposition in 1855.

**GORDON, JUDAH LOEB or LEON** (1830-92). A Russian Hebrew writer. He was born and educated at Vilna. Although a graduate of a rabbinical seminary, all his life he strenuously opposed the backward and fanatic rabbis and their obscurantist supporters. For 20 years he was a teacher in various Jewish public schools in the Government of Kovno. In 1872 he was called to St. Petersburg to become secretary of the Society for the Dissemination of Culture among the Jews of Russia. Accused of political conspiracy in 1879, he was exiled to the Govern-

ment of Olonetz. Having proved his innocence, he was soon allowed to return to St. Petersburg and became one of the editors of the Hebrew periodical *Ha-Meliz*. The Jewish massacre of 1882 and the subsequent persecutions embittered the last years of his life. His writings comprise poetry (6 vols., 1898), prose fiction (3 vols., 1870-89), and letters (2 vols., 1894). Besides Hebrew, Gordon wrote considerably in Russian. Yiddish, however, he deprecated, although he published a volume of poems in that language (*Sichoth Chulin*, 1886). Gordon is the greatest poet of the Haskalah, or rationalistic school of Hebrew writers, his epics and rhymed fables being especially excellent. His letters reflect most faithfully the intellectual conditions of Russian Jewry in the nineteenth century. Consult Slouschz, *The Renaissance of Hebrew Literature* (Philadelphia, 1909).

**GORDON, JULIEN.** The pseudonym of Julie Grinnell Chance (q.v.), formerly Mrs. Van Rensselaer Cruger.

**GORDON, LADY JUCIE (or LUCY) AUSTIN DUFF.** (1821-69). An English author and translator, born in London. She was the only daughter of John Austin the jurist. Her knowledge of German was gained during a two years' stay in Germany (1826-28). In 1840 she married Sir Alexander Duff-Gordon and almost immediately began her translations. These include: *Studies of Ancient Greek Mythology*, from the German of Niebuhr (1841); Meinhold's *Mary Schweidlet*; Lomping's *The French in Algiers* (1845); Feuerbach's *Remarkable Criminal Trials* (1846, with her husband); Ranke's *Memoirs of the House of Brandenburg*; De Wailly's *Stella and Vanessa* (1850); the Countess d'Arbouville's *The Village Doctor* (1853); and Ranke's *Ferdinand I and Mamluk II* (1853, with her husband). At this period she lived in London and counted among her friends Heine, Tennyson, Dickens, and Thackeray. About 1860 her health failed, and she made a voyage to the Cape of Good Hope, which her *Letters* describe (1861-62). The latter years of her life were spent in Egypt, and from there she wrote her two series of delightful letters, *Letters from Egypt* (1863) and *Last Letters from Egypt* (1865).

**GORDON, PATRICK** (1635-99). A Scottish soldier of fortune, general in the Russian army, and a friend of Peter the Great. He first served (1651) in Poland under Charles X of Sweden. Captured by the Poles, he entered their service, only to rejoin the Swedes when recaptured by them at Warsaw. Next the German flag claimed his allegiance, but he soon took service again in the Swedish and Polish armies successively. In 1661 he entered the Russian service, in which he remained until his death. The Czar Alexis sent him on a mission to England, where, in 1665, he had an interview with Charles II. Although raised to the rank of lieutenant general in the Russian service and in high favor with the boy Czar, Peter, yet on another visit to England in 1686 he greatly desired to enter the army of James II. Peter would not grant him his request and soon afterward promoted him to the highest rank, that of general. In the contest between Peter and his sister Sophia, which resulted in a revolution, it was chiefly through Gordon's help that Peter triumphed. His last years were spent in opulence and honor and in high favor with the Czar. Gordon kept a journal during the last 40 years of his life,

which was published at Moscow and St. Petersburg in three volumes in 1849-53, under the title *Tagebuch des Generals Patrick Gordon zum erstenmal vollständig veröffentlicht durch Dr. P. M. C. Posselt*, and a part of it was published in English in 1859, as *Passages from the Diary of General Patrick Gordon of Auchleuchries*.

**GORDON, PATRICK** (1644-1736). An English soldier and Colonial Governor in America. After serving for some years in the English army, he was appointed Governor of Pennsylvania in 1726 and held this position until his death. A man of ability and character, he was one of the most popular of the Colonial governors of the province and was successful for the most part in winning the confidence of the Indians, though it was during his administration in 1733 that they were virtually defrauded of part of their lands by the famous "walking purchase." Gordon published *Two Indian Treaties at Conestogoe* (1728).

**GORDON, WILLIAM** (1728-1807). An English clergyman and writer, born at Hitchin, Hertfordshire. He entered the independent ministry in 1762 at Ipswich, preached at Southwark from 1764 to 1770, emigrated to America in the latter year, settled at Roxbury, Mass., and remained in America until 1786, when he returned to England, where he subsequently held several pastorates. While in America, during the Revolutionary War, he strongly sided with the Patriot party and in 1788 published, in four volumes, a *History of the Rise and Independence of the United States, Including the Late War*, which for more than 100 years was considered one of the most valuable sources for the history of the Revolution, but which has recently been shown to have been plagiarized, in large part, from the *Annual Register*, and from Ramsey's *History of the Revolution in South Carolina*, which he saw in manuscript. Consult Libby, "A Critical Examination of Gordon's History of the Revolution," in the *Report of the American Historical Association* for 1899 (Washington, 1900). He also wrote a *Treatise Concerning Religious Affections* (1762) and was a contributor to the *Protestant Dissenter's Magazine*.

**GORDON-CUMMING, CONSTANCE FREDERICA** (1837- ). A Scottish traveler and writer, the daughter of Sir William Gordon-Cumming, and a sister of R. G. Gordon-Cumming. She was born at Altyre. After 1867 she spent many years traveling in the East and published, among other books of travel, *From Hebrides to the Himalayas* (1876); *At Home in Fiji* (1882; 2d ed., 1886); *Fire Fountains of Hawaii* (1883); *Granite Crags of California* (1884). In the *Himalayas and on the Indian Plains* (1884); *Wanderings in China* (1886; 2d ed., 1900); *Two Happy Years in Ceylon* (1892). She also wrote *Work for the Blind in China* (1888), which is now incorporated in *The Inventor of the Numeral Type for China* (1899), an account of the life and work of the Rev. W. H. Murray, of Peking.

**GORDON-CUMMING, ROUALEYN GEORGE** (1820-66). A British traveler and African lion hunter, brother of Constance Gordon-Cumming. From an early age he was fond of sports. He served under the East India Company in 1838-40, in the Royal Veteran Newfoundland Companies, and in the Cape Mounted Rifles in 1843. Resigning his last commission, he started on a five-year hunting trip in South Africa, chiefly in Bechuanaland and in the Limpopo

valley. He returned to England in 1848 and two years later published the story of his hunting exploits in his book, *Five Years of a Hunter's Life in the Far Interior of South Africa*. This book was very successful; a third edition appeared in 1851, and an abridged edition under the title *The Lion Hunter of South Africa* came out in 1856 (new ed., 1904).

**GORDON HIGHLANDERS.** See HIGHLANDERS.

**GORDONIA**, gôr-dô'ni-à (Neo-Lat., named in honor of James Gordon, a London nurseryman of the eighteenth century). A genus of trees and shrubs of the family Ternstroemiaceae, of which several species are natives of America. Of these the most important is the loblolly bay (*Gordonia lusianthus*), which is found in swamps near the seacoast from Virginia to the Gulf of Mexico. Moist tracts of considerable extent are often covered with this tree alone. It is a shrub, or small tree, with oblong leathery evergreen leaves and beautiful white sweet-scented flowers more than an inch in diameter. The bark is used for tanning. The wood is handsome, resembling mahogany, but is very perishable. In England it is cultivated with some difficulty and generally appears as a mere bush. *Gordonia altamaha*, an American species, is of interest on account of the entire disappearance of the tree in its original habitat: it is wholly unknown in a wild state. It is said to be hardy as far north as Massachusetts, and all the specimens now growing are believed to have sprung from a single tree that long stood in Bartram's garden in Philadelphia. A number of other species of this genus are found in eastern Asia. As ordinarily seen in cultivation, they are all shrubs. See BAY.

**GORDON RIOTS.** The name given to a mob uprising, directed against the Roman Catholics, which occurred in London in 1780. See GORDON, GEORGE, LORD, BARNABY RUDGE.

**GORDY, JOHN PANCOAST (1851-1908).** An American educator, born in Maryland. He received an academic education and also studied at Leipzig. He was professor of education at Ohio University (Athens) from 1886 to 1896, at the Ohio State University (Columbus) from 1896 to 1900, and in 1901 was appointed to a similar chair in New York University. His most important publication is the *Political History of the United States, with Special References to the Growth of Political Parties*, vols. i and ii (2d rev. ed., 1903). He wrote also: *Lessons in Psychology* (1890); *Growth and Development of the Normal School Idea in the United States* (1891); *New Psychology* (12th ed., 1898); *A Broader Elementary Education* (1903).

**GORE.** In heraldry an abatement of honor. It consists of two curved lines which meet in an acute angle at the centre of the escutcheon.

**GORE, MRS. CATHERINE GRACE (1799-1861).** An English novelist, the daughter of a wine merchant named Moody, and born at East Retford, Nottinghamshire. In 1823 she married Capt. Charles Arthur Gore. Her first novel was *Theresa Marchmont, or the Maid of Honor* (1824). Some of her early novels, as the *Lettre de Cachet* (1827) and the *Tuileries*, were vivid descriptions of the French Revolution; but her greatest successes were her novels of English fashionable life, conspicuous among which were: *Cecil, or the Adventures of a Coacomb* (1841), and its sequel, *Cecil, a Peer* (1841); *The Ambassador's Wife* (1842); and *The Banker's Wife*

(1843). She also wrote a prize comedy entitled *Quid pro Quo, or the Days of Dupes*; a popular comedy called *The School for Coquettes* (1831); and several other dramatic pieces. Her novels and tales number about 100. Though very popular in their own time, they are now forgotten. They possess, however, great value as transcripts of contemporary fashionable society. Consult Thackeray's burlesque, "Lords and Liveries," in *Novels by Eminent Hands* (London, 1847).

**GORE, CHARLES (1853- )**. An English theologian and prelate. He was educated at Harrow and at Balliol College, Oxford, and was a fellow of Trinity from 1875 to 1895. After ordination he held the position of vice principal of Cuddesdon Theological College from 1880 to 1883. On the foundation in 1884 of the Pusey House at Oxford, which was intended not only to provide a home for Dr. Pusey's large theological library, but to exercise spiritual influence over undergraduates by means of a staff of clerical librarians, he was appointed its head and remained there until 1893. Meanwhile, as editor and one of the principal contributors to the volume of essays called *Iuxta Mundi* (1890), he had aroused considerable distrust by the advanced and, as many thought, unsound nature of his views on the incarnate nature of Christ, especially the technical point known as the *kenosis* (q.v.); and his resignation was an obvious solution of the difficulty. While vicar of Radley, near Oxford (1893-94), he founded a quasi-religious clerical community called the Society of the Resurrection. He was canon of Westminster from 1894 to 1902 and continued to exercise considerable influence by his powers as a preacher. After 1898 he served as chaplain to the sovereign. In 1902 he was made Bishop of Worcester, in 1905 Bishop of Birmingham, and in 1911 Bishop of Oxford. His most important works are: *The Church and the Ministry* (1889); *The Mission of the Church* (1895); *Dissertations on Subjects Connected with the Incarnation* (1895); *The Body of Christ* (1901); *The Permanent Creed* (1905); *The New Theology and the Old Religion* (1908); *Orders and Unity* (1910); *The Question of Divorce* (1911), besides a strong controversial treatise called *Roman Claims* (1889), and commentaries on the epistles to the Ephesians (1899) and to the Romans (1899).

**GORE, CHRISTOPHER (1758-1829).** An American lawyer and politician, born in Boston, the son of a Loyalist who was banished in 1778 and restored to citizenship in 1787. He graduated at Harvard College in 1776, studied law in the office of Judge Lowell, and soon established himself as a successful lawyer in Boston. In 1789 Washington appointed him the first United States district attorney for the State of Massachusetts. He held this office until 1796, in which year he was appointed, with William Pinckney and Jonathan Trumbull, a commissioner to England, under the Jay Treaty, to settle the American spoliation claims, and he remained in England eight years. In 1803-04 he was chargé d'affaires at London during the absence of Rufus King, the American Minister. He returned to America in 1804 and resumed the practice of his profession in Boston. He allied himself with the Federalist party, by the leading members of which his advice was much sought. He was, in 1808, a vigorous opponent of the Embargo, and was accused by the Republicans, with Pickering and other members

of the Essex Junto, of planning the secession of New England and New York from the Union and erecting an independent confederacy under the protection of England. In 1809 he was elected by the Federalists Governor of Massachusetts. He was, however, defeated in 1810 by Elbridge Gerry. He was the unsuccessful candidate of his party again in the following year, being defeated a second time by Gerry. After several years spent in private life during a period of great political excitement, he was, in 1814, appointed to the United States Senate by Governor Strong to fill a vacancy, which appointment was confirmed by the Legislature in the following year. In 1817 he resigned from the Senate on account of ill health and passed the remainder of his life on his large country estate at Waltham, Mass. Consult a "Memoir," in *Massachusetts Historical Society Collections*, 3d series, vol. iii (Boston, 1833).

**GORE, GEORGE** (1826-1908). An English physicist and chemist, born at Bristol. He did not attend school after his twelfth year, but while earning his living he applied himself so industriously to study that he was able to make discoveries which secured for him an election as fellow of the Royal Society (1865), and the degree of LL.D. from the University of Edinburgh (1877). His researches in the main were in the departments of electrochemistry, electrometallurgy, and chemistry, and were rewarded by many discoveries which are described in the leading English scientific journals. Gore was for many years lecturer on physics and chemistry at the Grammar School of King Edward VI at Birmingham. In 1891 he was awarded a civil-list pension of £150 a year in recognition of the national importance of his scientific discoveries, several of which have had widespread application in the arts. He was the author of *The Art of Scientific Discovery* (1878); *The Scientific Basis of Morality* (1882); *The Art of Electro-Metallurgy* (1877; 5th ed., 1891); *The Electrolytic Separation and Refining of Metals* (1890); and other works.

**GORE, THOMAS PRYOR** (1870- ). An American legislator, born in Webster Co., Miss. When he was eight years old, an accident cost him the sight of his left eye, and, when eleven, he lost the sight of his right eye also. Nevertheless, he was able to graduate from the normal school at Waltham, Miss., in 1890 and from Cumberland University in 1892. He taught school in 1890-91 and was admitted to the bar and began the practice of law in Mississippi in 1892. Moving to Texas in 1895, he was candidate for Congress on the People's party ticket in 1898, but having become a Democrat the next year he did campaign work for his party in South Dakota in 1900 and in various States in 1904, becoming noted as an orator. In 1901 he moved to Oklahoma, where he was a member of the Territorial Council in 1902-05. Upon the admission of Oklahoma to statehood, he was elected United States Senator in 1907, being re-elected for a full term in 1909. In 1912 he became a member of the executive committee of the Democratic National Committee. In 1914, through what was afterward supposed to have been a political "frame-up," suit was brought by a woman against Senator Gore, accusing him of dishonorable conduct; he was completely exonerated, and was again re-elected.

**GORE-BILL**. A garfish. See **GAB**.

**GORECKI, gó-réts'ké, ANTON** (1787-1861).

A Polish poet, born and educated in Vilna. He took an active part in the Polish revolution of 1830 and in consequence was obliged to flee to Paris. His complete works were published in two volumes at Leipzig in 1886. One of his best-known productions is entitled *The Death of the Traitor*.

**GORÉE, gó-rá'**. A small island southeast of Cape Verde, off the west coast of Africa. It is about 3 miles in circumference, and the larger part is occupied by the town of Gorée, once an important free port, but now of little commercial importance. Its present value lies in its climate, and it serves as a health resort for the French officials stationed on the west coast of Africa. It is fortified and has a population of about 2000. The island was first in the possession of the Dutch, but has belonged to the French colony of Senegal since 1814.

**GORE HOUSE**. A mansion in Kensington, London, famous as a gathering place for literary men, through its two tenants, William Wilberforce and the Countess of Blessington. The former took up his residence there in 1809. Upon the site now stands the Albert Memorial.

**GORELL OF BRAMPTON, JOHN GORELL BARNES, BARON** (1848-1913). An English jurist and judge, son of Henry Barnes, a Liverpool shipowner. He was educated at Peterhouse, Cambridge; became a solicitor, in 1876 a barrister of the Inner Temple, and in 1888 a Queen's counsel; practiced largely in admiralty cases; and in 1892-1905 was judge, and in 1905 president (succeeding Sir Francis Jeune), of the probate, divorce, and admiralty division of the High Court of Justice. He was made first Baron Gorell of Brampton in 1909. From 1910 to 1912 he was chairman of the Divorce Commission, of which his son, Henry Gorell Barnes (1882- ), who succeeded to the title, was secretary.

**GOREMYKIN, gó-ré-mík'in, IVAN LOGGINOVITCH** (1839- ). A Russian statesman, born in the Government of Novgorod. In 1860 he entered the Imperial Law School of St. Petersburg (Petrograd) and four years later went, with the commission to form a new government, to Poland. There he stayed for several years, becoming Vice Governor of Plock in 1866 and of Kielce in 1869, and returning to Poland for the years 1873-79. In 1881 and 1893 he served on commissions on agrarian reform, and his reports on the condition of the peasants won him the Czar's confidence, so that (after serving in the Department of Justice in 1891 and in the Ministry of the Interior) he was Minister of the Interior in 1895-99, succeeding Durnovo. His administration was comparatively mild: Jews with university education were permitted to live outside the pale; the first census of the Empire was taken in February, 1897. Probably he helped plan the first Peace Conference. In 1897 he addressed a memorial to the Czar urging administrative reform. Witte's opposition to his plan (1899) to extend *zemstvo* representation forced Goremykin out of the cabinet. Succeeding Witte as Premier in May, 1906, although he had the Czar's confidence, he had to resign in July after a contest with the impractical and far from docile first Duma. In February, 1914, he became Premier again, succeeding Kokovtsov. He wrote in 1869 a historical sketch of the Polish peasantry. For a brief sketch of his career, consult Cleinow in *Grenzboten*, Jahrg. 73, pp. 337-348 (1914).

**GORGAS**, gôr'gas, WILLIAM CRAWFORD (1854–). A distinguished American sanitarian, surgeon general in the United States army. He was born at Mobile, Ala., and graduated from the University of the South in 1875 and from Bellevue Hospital Medical College in 1879. After serving as an interne at Bellevue in 1878–80, he was appointed a surgeon in the army in 1880. From 1898 to 1902 he was chief sanitary officer of Havana, Cuba, where his methods of fighting yellow fever succeeded in eliminating that disease from the city. For these services Congress, by a special Act in 1903, made him assistant surgeon-general, with the rank of colonel. From 1904 to 1913, as chief sanitary officer of the Panama Canal, he established and maintained marvelously healthful conditions on the Isthmus throughout the great community of workers, most of whom had to become acclimated and to adjust themselves to the food and habits of a tropical land. The task of Colonel Gorgas was in its way as great as that of the engineers; without his resourcefulness, skill, and untiring labor the building of the canal would have meant immense sacrifice of life. He was a member of the Isthmian Canal Commission after 1907 and received numerous honors—he was elected president of the American Medical Association in 1908 and of the American Society of Tropical Medicine in 1910, was awarded the Mary Kingsley medal of the Liverpool School of Tropical Medicine in 1907, was delegate from the United States to the Pan-American Medical Congress at Santiago, Chile, in 1908, and was the recipient of honorary degrees from a number of American universities, among them Harvard, Brown, Columbia, Princeton, and Yale, and the degree of D.Sc. from Oxford (1914). He received a gold medal from the American Medical Association in 1914; and in the same year he was appointed surgeon-general in the United States army with the rank of brigadier general. See PANAMA CANAL.

**GORGE**. The rear opening between the faces or flanks of a fieldwork or fortification. The *gorge* is prepared for defense by obstacles or trenches, or both. See BASTION.

**GORGED** (from OF., Fr. *gorge*, throat, from Lat. *gurgus*, gulf). A term in heraldry (q.v.), applied to a lion or other animal having a collar round its neck. The collar is generally in the form of a crown or coronet.

**GORGES**, gôr'jës, SIR FERDINANDO (c.1566–1647). The founder of Maine and sometimes called “the father of English colonization in America.” He was born probably in Ashton Phillips, England, entered the army, served in Normandy in 1591, distinguished himself and was knighted at the siege of Rouen, and from 1596 to 1629 he was, with but a short suspension in 1603, “Governor of the forts and island of Plymouth.” He seems to have been engaged in the conspiracy led by the Earl of Essex, against whom he was witness in the trial of 1601. Becoming early interested in the settlement of the New World, he was one of the grantees in the royal charter of 1606 and was one of the founders of the unsuccessful Popham Colony at the mouth of the Kennebec River, in Maine, in 1607. Capt. John Smith, as agent for Gorges, made several unsuccessful attempts to establish other settlements; and in 1616 Gorges sent out a small party which encamped for the winter on the river Saco. In 1620 Gorges and his associates obtained a new charter, which

gave them title to the territory between the fortieth and forty-eighth parallels north latitude, extending westward from the Atlantic to the Pacific. Gorges and John Mason, in August, 1622, took from the Council for New England a grant of the district lying between the Merri-mac and the Kennebec and extending 60 miles inland; and under the auspices of the former several settlements were made. In 1629 this grant was divided, Gorges taking the portion east of the Piscataqua. In 1623 Capt. Robert Gorges, son of Ferdinando, was appointed by vote of the Council for New England “General Governor of the country.” Twelve years later the Council resigned the charter to the King, the elder Gorges expecting to be thereupon appointed Governor-General. Disappointed in this, he induced the King to grant him a charter constituting him lord proprietor of the Province of Maine and providing that his office should remain hereditary in his family. His son, Thomas, was sent out as Deputy Governor. The principal settlements were Agamenticus and Saco, the former being the place now called York, which was chartered as a city in 1642 under the name of Gorgeana. But the English Civil War, in which Gorges was a follower of the King, was unfavorable to his Colonial project. In 1643 the four New England Colonies formed an alliance for mutual defense, excluding therefrom the Gorges settlements, and after his death these settlements formed themselves into a body politic and submitted to the jurisdiction of Massachusetts. Gorges wrote *A Briefe Narration of the Originall Undertakings of the Advancement of Plantations into the Parts of America, especially showing the Beginning, Progress and Continuance of That of New England* (1658), which has been much used by historians and may be found in vol. ii of the *Maine Historical Society Collections* (Portland) and in the 3d series, vol. vi of the *Massachusetts Historical Society Collections*. Consult Baxter (ed.), *Sir Ferdinando Gorges and his Province of Maine* (3 vols., Boston, 1890), one of the “Prince Society Publications.”

**GORGET**, gôr'jët (OF. *gorgette*, *gorgete*, Fr. *gorgette*, collar, dim. of *gorge*, throat). One of a series of surgical instruments, devised to facilitate the operation of lithotomy. Gorgets are now almost entirely out of use.

**GÖRGEY**, gër'gë-I, or **GORGEI**, ARTHUR (1818–1916). An Hungarian general in the revolution of 1848–49. He was born at Toporecz, in the County of Szepes (Zips), Jan. 30, 1818, received a military education, and was commissioned a lieutenant of hussars. While at Vienna, he combined a university education with his military work. He threw in his lot with the National party in the rising against Austria in 1848 and was at first employed in the purchase of arms in Belgium. In August, 1848, he received an important command and soon distinguished himself against the Croats, whom he prevented from crossing the Danube. He exhibited great military capacity after the rout of the Hungarian army near Schwechat, in October, 1848, conducting the retreat with consummate skill. Upon the appointment of Dembinski (q.v.) to the chief command of the Hungarian armies, Görgey showed his dissatisfaction in various ways, and it was said that his late arrival at the battle of Kápolna prevented a great Hungarian victory. He practically revolted against Kossuth and the government.

After Dembinski's resignation Görgey was made commander in chief in his place and succeeded in putting into the field an army of 40,000 men, with which he executed a brilliant advance against the Austrians under Windischgrätz. Pest was evacuated by the enemy, the siege of Komorn was raised, and before the month of April was over the Austrians had been almost driven out of Hungary. Buda, the ancient capital of the realm, well fortified and garrisoned, had still to be taken, and for this the victorious campaign was interrupted. The city was stormed May 21, but the three weeks' delay proved fatal. Russia intervened in behalf of Austria, and Radetzky sent several regiments from his victorious army in Italy. After an unsuccessful engagement at Komorn and a battle with the Russian main army at Waitzen (July 15), he made his way towards the upper Theiss. The Hungarians, outnumbered by the united Austrian and Russian armies, were gradually driven to the wall. Görgey, after some weeks, arrived in the neighborhood of Arad with an army decimated by continual fighting, by heavy marches, and by disease. On August 9 the army under Dembinski was vanquished in the battle of Temesvár, and on the 10th Görgey was declared dictator in place of Kossuth. But further resistance on the part of the Hungarians was hopeless, and on the 13th Görgey's army surrendered at Világos to General Rüdiger, the Russian commander. For this surrender Görgey was severely blamed and charged with treachery; but the facts are that on the day of surrender Görgey had only 24,000 men with 140 cannon, while five armies, with more than 200,000 men and 1000 cannon, were closing in upon him from every direction. Görgey was confined for a time at Klagenfurt in Austria, whence he was released on parole. All of his generals were court-martialed, but he escaped that ignominy. In 1852 he published at Leipzig *Mein Leben und Wirken in Ungarn in den Jahren 1848 und 1849*, a translation of which, *My Life and Acts in Hungary, 1848-49*, appeared in New York the same year. This was really a reply to the charge of treason to the Hungarian cause. He returned to Hungary in 1868. Consult Elemar, *Gorgei in 1848-49* (Budapest, 1886).

**GORGAS** (Lat., from Gk. Γοργίας) (c.483-375 B.C.). A celebrated Greek rhetorician and Sophist. He was born at Leontini in Sicily, but spent most of his life in Greece, residing at Athens and at Larissa in Thessaly. The arrival of Gorgias at Athens as an Ambassador from his native state, in 427 B.C., was fraught with important consequences for the literary life of Athens, for in him the Athenians first saw an exponent of the art of rhetoric as it had been developed in Sicily. The success of Gorgias was immediate. The Athenians thronged to hear his speeches, and it is not too much to say that the great development of oratory at Athens during the fourth century was due primarily to this Sicilian orator. Numerous teachers of rhetoric, the Sophists (q.v.), sprang up, against whose doctrine of "form, rather than substance," Socrates and Plato directed their teaching. In the *Gorgias* of Plato we have an ideal dialogue between the Sicilian orator and Socrates. Two orations—the *Palamedes* (Παλαμήδης) and the *Encomium on Helen* (Ἐλένης Ἐγκώμιον)—have come down under his name, but scholars are not agreed whether they are

really by him or not. Consult: Blass, *Die attische Beredsamkeit*, vol. i (Leipzig, 1887); Jebb, *The Attic Orators*, vol. i (London, 1876); Gomperz, *Greek Thinkers*, vol. i (Eng. trans., ib., 1905); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908).

**GORGO**, or **GORGON** (Gk. Γοργώ, *Gorgō*, Γοργώνη, *Gorgonē*, Γοργάς, *Gorgas*, from γοργός, *gorgos*, grim). A sister of the Graæ (q.v.) and the daughter of Phorcys and Ceto. In the *Odyssey*, xi, 633, Odysseus fears that Persephone may send forth against him the Gorgon's head, which is therefore regarded as belonging to the Lower World. The later legend, given by Hesiod, knows Gorgo as a terrible female monster, with hideous face, hair of bronze or intertwined with serpents, mighty wings, and clad in black. (Gorgo or Medusa (Μέδουσα, the Queen) is mortal, but her two sisters, Σθενώ (the Strong) and Εὐρυάλη (the Far Leaper), are immortal. Medusa is the most terrible; one glance from her eyes turns any human being to stone. Though she was hated by the other gods, Poseidon loved her. These Gorgons lived in the Far West, near the garden of the gods and the realm of the dead. Medusa was beheaded by Perseus and from her trunk sprang the fruit of Poseidon's love, Chrysaor, of the golden sword, and the winged horse, Pegasus. The head, with its petrifying power, was used by Perseus against his enemies and was later taken by Athena and placed upon her ægis. Attic legend knew of but one Gorgon, produced by Gæa to aid the giants against the gods, and slain by Athena, while the later poets explained Poseidon's love by telling of the maiden Medusa, who won the love of the god, but inspired the jealousy of Athena, who transformed her into the hideous monster and guided Perseus to her destruction. Roscher (see below) held that the Gorgons are a personification of destructive and terrifying thunderstorms, which come with speed from the western ocean. Hence the golden sword of the lightning and the bearer of thunderbolts, Pegasus, spring from her dead body. Hence, too, the appearance of the Gorgoneion on the ægis of Zeus and Athena, who are armed with the thunderbolt. The head of the Gorgo was used by the Greeks for apotropaic purposes, i.e., to ward off the evil eye or other evil influences. Another view, noting that the power of Medusa was in her head, explains the whole story of the Gorgon as derived from the ritual mask common to primitive cults. In Greek art the Gorgoneion does not appear much before the seventh century B.C. Its earliest form is certainly the hideous mask, with round face, snaky hair, huge staring eyes, and wide mouth, with projecting tongue and tusklike teeth, which was used to keep off the evil spirits, and from which the later figure of the Gorgon develops. There was a later conception of the Gorgon as beautiful, best seen in the "Medusa Rondanini" at Munich. Consult: Roscher, *Die Gorgonen und Verwandtes* (Leipzig, 1890); Six, *De Gorgone* (Amsterdam, 1880), especially for the coin types. Particularly good are the article by Roscher and Furtwängler in Roscher's *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886-90) and that by Glotz, in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1896). Consult also Harrison, *Prolegomena to the Study of Greek Religion* (Cambridge, 1903).

**GORGONIA'CEA** (Neo-Lat., from *Gorgonia*, from Lat. *gorgonius*, relating to the Gorgon, from *Gorgo*, Gorgon; so called from hardening in the air). An order of alcyonarian corals (*Octocoralla*), in which the colony has a branching or fan-shaped structure. See SEA FAN, and Plate with CORAL.

**GORGONZO'LA**. A town in the Province of Milan, north Italy, 11 miles northeast of the city of Milan, famous for its cheese. Pop. (commune), 1901, 4895; 1911, 5198.

**GOR'HAM**. A town in Cumberland Co., Me., 10 miles northwest of Portland, on the Presumpscot River, and on the Boston and Maine Railroad (Map: Maine, B 5). It is in an agricultural region, has a tannery, and contains a State normal school, public library, and an historical museum. Pop., 1900, 2540; 1910, 2822.

**GOR'HAM**, GEORGE CORNELIUS (1787-1857). An English theologian, who became known as the principal figure in the "Gorham case." He was born at St. Neots, Huntingdonshire, was educated at Queen's College, Cambridge, received the degree of B.A. in 1808, was elected a fellow of his college in 1810, and held that appointment until 1827. Even before his ordination (1811) there, his views on baptismal regeneration had caused comment, and particularly his contention that by baptism infants do not become members of Christ and the children of God; but the discussion did not become crucial until the question of his appointment to the vicarage of Bramford Speke came up before Dr. Phillpotts, Bishop of Exeter. (See GORHAM CONTROVERSY.) Gorham obtained his vicarage in 1851, and the question of the views on baptismal regeneration allowed in the Church of England was left unsettled. He was an antiquary of some reputation and the author of a number of pamphlets.

**GORHAM CONTROVERSY**. A theological controversy within the Church of England as to the teaching of this church with reference to the sacramental grace of baptism. The occasion was a suit by the Rev. George C. Gorham against the Bishop of Exeter for induction into the vicarage of Bramford Speke, in spite of his denial of baptismal regeneration. The Archbishops Court of Canterbury decided in 1845 against Mr. Gorham, maintaining that baptismal regeneration is the doctrine of the Church of England, while on appeal the judicial committee of the Privy Council reversed the judgment of the lower court, without, however, expressing any opinion as to the theological accuracy of Mr. Gorham's opinions. The decision and the attitude of the high dignitaries of the Church of England, amid the fierce controversy which arose in regard to it, were the main determining factors in Manning's decision to submit to the Roman obedience. Consult Purcell, *Life of Cardinal Manning* (London, 1897).

**GORI**, gò'rè. The capital of a district in the Russian Government of Tiflis, Caucasus, 48 miles west-northwest of Tiflis, on the Poti-Tiflis Railway (Map: Russia, F 6). It is picturesquely situated at an elevation of 2000 feet and at the foot of a mountain crowned with the ruins of the ancient fortress of Goris-Tsikhe. In one of its churches is kept an ancient icon, believed to have been presented in the sixth century to a member of the family of the Bagratides by one of the Byzantine emperors. Gardening, vine growing, wine making, and trading

are the principal occupations. Pop., 1891, 7200; 1897, 10,450. Founded, probably, in the seventh century.

**GORI**, gò'rè, ANTONIO FRANCESCO (1691-1757). An Italian antiquary. He was born at Florence, where he was ordained a priest in 1717. Through the influence of Archbishop Fontanini he was enabled to devote himself extensively to antiquarian and archaeological studies. He succeeded Corsotti in the chair of history at the University of Florence, founded the *Accademia Columbaria* in 1735, and continued the catalogue, begun by Assemani, of the Oriental books and manuscripts at Florence. Among his writings, which had a very considerable influence on the progress of archaeological science, are: *Inscriptiones Antiquæ Græcæ et Romanæ quæ Extant in Hetruriae Urbibus* (1726-44); *Monumentum Columbarium Libertorum et Servorum Livie Augustæ et Cæsarum* (1729); *Museum Florentinum* (1731-43); *Museum Etruscum* (3 vols., 1737-43); *Symbolæ Litterariæ* (1748-58); *Vita di Mich. Angelo Buonarroti* (1746); *Thesaurus Diptychorum, cum Notis Passeri* (3 vols., 1750), probably his most valuable work.

**GORIL'LA**. The greatest of the anthropoid apes (*Gorilla gorilla*), a native of the western equatorial coast of Africa. Its name recalls a curious history. When Hanno, the Carthaginian, returned from his voyage of exploration down the west coast of Africa, about 500 B.C., he reported that he had seen hairy women whom the natives called gorillas (Gk. γορῖλλαι); but as he went only to the Bight of Benin, and gorillas, so far as we know, never lived north of the Kameruns, the creatures Hanno saw, if any, were either chimpanzees, or, more probably, dog-faced baboons. The next mention of the animal is in an account printed in 1613 in *Purchas, His Pilgrims*, of the experiences of an English sailor named Battel on the Guinea coast, in which he tells of a great ape which the natives knew by various names, and the Europeans called gorilla. Such an ape was described again by Bowdich in his *Mission from Cape Coast Castle to Ashantee* (London, 1819). Finally, in 1847, Prof. Richard Owen, of London, obtained from Dr. Savage, a missionary at the Gabun, drawings of the skull of the mysterious ape, and a few months later Professor Owen received two skulls, which he described as "*Troglodytes savagel*," considering the animal to be of the same genus as the chimpanzee. That an American missionary, Rev. Leighton Wilson, is entitled to credit for early investigation of the animal, appears from his book, *Western Africa* (New York, 1856), in which he gives an extended account of the "recently discovered" gorilla, and says that he was "the first to call the attention of naturalists to the animal." He found a skull towards the close of 1846 and sent it to the Boston Society of Natural History, where it became the subject of immediate study and writings. Indeed, Wyman's description of this ape as *Troglodytes gorilla* in the *Journal of the Society* antedated that of Owen, so his specific name takes precedence. Wilson's book contains much interesting information.

In 1852 a migration of these apes was made to the coast (probably due to an extraordinary failure of food in the interior, for one has never been seen there since), and several were killed whose skeletons reached both Europe and America. This new material showed such de-



partures from the structure of the chimpanzee that a French naturalist, I. Geoffroy Saint-Hilaire (consult *Comptes Rendus*, vol. xxxiv, Paris, 1852), erected for it a new genus, *Gorilla*, based upon such peculiarities as the great cranial ridges, the shape of the teeth, the disparity in size between the sexes, etc.; and this has received scientific approval. Owen's classic anatomical studies were in the *Transactions* of the Zoölogical Society of London for 1848, and in the *Proceedings* of the Royal Institution, for 1855, part ii.

The gorilla is not only the largest anthropoid ape, but the males are on the average larger than man himself, usually exceeding 6 feet in height when they stand upright. The females, however, unlike any other kind of ape, are always much smaller, usually  $4\frac{1}{2}$  feet tall, nor do they have great protuberances above the orbits of the eyes, and the long, exposed canine teeth, which give their mates so ferocious an appearance. The shoulders of a male gorilla are extraordinarily broad and massive, supporting a somewhat conical head on a thick "bull" neck, and giving attachments and leverage necessary for the powerful muscles of arms that, when they hang by his side, reach nearly to the calf of the leg. The hands are very broad, and the fingers short, thick, and united by webs nearly to the first joint. The legs are shorter in proportion than man's, have fairly developed calves, and the feet, like the hands, are broad and blunt, the toes being very large and short, and the great toe set out at an angle like a thumb; and the whole foot is nearly straight. The body is covered in most parts with long, coarse hair, blackish below but whitish at the tips, giving a brownish-gray aspect; but individuals vary greatly in color, and all grow grizzled with age. This hair becomes very long on the shoulders, back, and thighs, and on the top of the head and nape is stiff and erectile, rising like a dog's hackles when the gorilla is angry. There is a distinct beard or ruff under the chin. Beneath the outer coarse hairs grows a coat of short curly hairs, approximating to a wool. "The whole skin of the face is of a deep-black color, of a glossy appearance, and sparsely sprinkled with coarse hairs. The ears are comparatively small, with their hinder border sharply angulated in the middle, . . . and of a deep-black hue."

The gorilla is a denizen of mountainous forests, and its habitat is confined to a narrow coast region of the French Congo, extending 3° or 4° north and south of the equator, drained by the Ogove, Gabun, and upper Benito rivers—probably less than 1000 square miles of territory. This is a hilly region of comparatively open, yet damp and shady forest, with thickets of scitamines and tree ferns, which abounds in trees bearing fruits that ripen at various times, affording the animals food the year round; in addition to which the gorillas occasionally raid the plantations of sugar cane, rice, etc., cultivated about the native villages.

It appears that these animals remain in the forest and are most common in the Sierra de Cristal, between the Ogove and Muni rivers. They spend most of their time in the trees, where they move about with surprising agility, considering their bulk, and swing and leap like the huge monkeys they are. They wander during the day in search of food in family parties consisting of two mates and offspring of various ages, but at night are wholly stationary. Sev-

eral writers assert they make nests only for the lying-in of pregnant females; but Herr Koppenfels declares that each night the female plait the branches of a tree top into a platform, and adds to this sticks and leaves, or moss, until she has a comfortable sleeping place for herself and her young ones; and that this is sometimes returned to for three or four nights in succession, but not longer. The male is said to sleep curled up at the foot of the tree, prepared to guard his family against leopards—almost the only foe he need fear. The gorilla's food consists mainly of fruits, especially the undeveloped spathe or "cabbage" of the oil palm, bananas, pawpaws, several plumlike fruits, and nuts, the hardest of which, allied to the kola nut, he cracks with a stone; but his great back teeth are well adapted to nut cracking and to crushing tough rinds. The gorilla also eats insects, honey, birds' eggs, and fledglings, and he is said to take flesh when he can get it, though he is not known to seek to kill other animals for the sake of eating them.

These animals are mainly arboreal, and when they go upon the ground usually walk on all fours, as their tracks constantly show, always turning the fingers of the hands under, and sometimes also the toes of the hind limbs. They walk erect with some difficulty, unless they can steady themselves by grasping something. They are shy, and even timid, usually retreating from man, and are rarely seen, even by the silent and stealthy natives of the forest, except by accident. When surprised, they run away screaming with fright, but if wounded or cornered make a terrible fight, using much the tactics of a bear, by rearing up and endeavoring to seize and pull the enemy near enough to tear it with their great teeth. Little is known of the exact range of these apes. Elliot recognizes two species which are divided into six forms.

Young gorillas are occasionally captured by the negroes, and several have reached Europe and America—the first as early as 1860, when it was carried about Great Britain for several months, no one regarding it as anything but a chimpanzee until after its death. Up to the year 1914 four or five have been seen in Berlin, London, and New York; but, in spite of the greatest care, only one survived more than 18 months before succumbing to lung disease. At that time a young specimen, two years old, in perfect health, was living in the New York Zoölogical Park. All of the gorillas which have been in captivity have been of a gentle, docile disposition, showing traits and an ability to learn very similar to those of the chimpanzee, eating all sorts of food, and having a childish fondness for their friends and for noise making and amusements.

**Bibliography.** The books already mentioned, and such general works as *Standard Natural History* (6 vols., Boston, 1885) and the *Royal Natural History* (6 vols., London, 1895), contain much of what is known of the subject. Consult also Hartmann, *Anthropoid Apes* (New York, 1886), which also furnishes a complete comparative account of the animal's structure and an extensive bibliography, and Elliot, *A Review of the Primates* (ib., 1913). See Plate of ANTHROPOID APES, under APE.

**GORINCHEM**, gō'rên-kēm. See GORKUM.

**GORING**, GEORGE, EARL OF NORWICH (c.1583–1663). See NORWICH, GEORGE GORING, EARL OF.

**GORING**, GEORGE, LORD (1608–57). An English soldier, son of George, Earl of Norwich.



(See NORWICH.) He married Lettice, daughter of the Earl of Cork, by whose influence he received a post in the Dutch service. He was wounded at Breda (1637), was appointed Governor of Portsmouth (1639), and served in both Scottish wars. He took part in the first army plot, hoping to become lieutenant general, but played the conspirators false as soon as he saw that his advancement was not certain. But he was never really allied with Parliament and in 1641 had made his peace with the King. He tried to get money both from the King and from Parliament, but in the fall of 1642 declared openly for the King. A month later Portsmouth was captured, and Goring fled to Holland and there tried to advance the King's interest. In 1643 he was again in England and after defeating Fairfax at Seacroft Moor was captured by him at Wakefield and sent to the Tower, but was finally exchanged. In 1644 he commanded the left wing at Marston Moor and was in the second battle of Newbury. His intrigues against Rupert, to win himself a command and to make himself indispensable, were grave factors in the defeat of the Royalist cause. He went so far as to quarrel openly with Prince Charles's counsel when the Prince came to take command in the West. He was forced to leave the siege of Taunton to meet Fairfax, after Naseby, and was defeated by him again at Langport (1645). Goring retreated to the north and left the Parliamentary army without opposition. Soon after he went to France on a plea of ill health. He served in the English regiments in the Netherlands.

**GÖRLITZ**, gër'lits. See GÖRZ.

**GÖRKUM**, **GÖRCHUM**, or **GORINCHEM**, gër'én-kém (Lat. *Gorcomium*). A town in the Netherlands, situated on the Merwede, 28 miles east-southeast of Rotterdam. The town has fortified gateways of the seventeenth century and interesting specimens of Dutch brick and tile mosaic architecture. It is famous for its salmon fisheries and carries on a trade in grain, hemp, and cattle. The town is the terminus of the Merwede Canal to Amsterdam. Gorkum is historically important as being the first city taken from the Spaniards by the Water Gueux in 1572. Pop., 1911, 12,053.

**GORKY**, gör'ké, MAXIM. The pseudonym of ALEXEI MAXIMÓVITCH PÉSHKOV (1868- ). A modern Russian writer, born at Nizhni Novgorod. Left a double orphan in early childhood, he was apprenticed to a shoemaker at nine. He then worked at the manufacture of ikons, as cook's helper, baker, public porter, and fruit vender, finally becoming a lawyer's clerk. It was from the cook on board a Volga steamer that Gorky acquired his literary passion and a thirst for knowledge. He was only 12 at the time, but four years later he set out for the University of Kazan in a vain effort to secure a free education. Disappointed and disgusted, he resumed his desultory pursuits. At 19 he attempted suicide and a few years later, in the company of outcasts and vagabonds, went tramping through south Russia. He was twice arrested for his revolutionary sympathies. In 1906, at the height of his popularity, he traveled in Europe and visited the United States in search of funds for the cause of Russian freedom. In America the intrusion of a moral issue of a personal nature—the legal status of a woman whom Gorky considered as his wife—ruined his mission and caused a revulsion of feeling against him which culminated in social

ostracism. He then sailed for Italy, where he lived thereafter.

Gorky's first sketch, *Makar Chudra*, appeared in 1892, but attracted little attention. His second striking tale, *Chelkash*, appearing in 1895 in *Russkoye Bogatstvo*, started the writer on the road to fame. In five years he became so popular in Russia that the first collection of his stories (1900) quickly sold out a large edition, and subsequent editions were equally successful. Beyond Russia Gorky's fame spread with amazing rapidity after 1901, when his first two tales appeared in English. Since then his works have been translated into every European language. Space forbids mentioning his short stories available in English. The following collections contain some of the better known: *Orloff and his Wife* (containing seven other tales, 1901); *Twenty-Six and One* (with two other tales, 1901); *The Outcasts and Other Stories* (1902); *Tales from Gorky* (nine in all, 1902); *Heartache, and The Old Woman Izerofel* (1905); and *The Individualists* (containing two other tales, 1906). His longer works in English include *Poma Gordeyev* (1901), *Three Men* (1902), *Mother* (1907), *The Spy* (1908), *A Confession* (1910), and the following dramas, which appeared in *Poet Lore: Summer Folk* (1905), *A Night's Lodging* (1905), *The Children of the Sun* (1906), *The Smug Citizen* (1906), and *The Lower Depths* (1912).

Gorky's most congenial field is the tale of the underworld he knows so well. When he leaves this realm, or when he attempts anything beyond the short story, he is far less successful. His plays, too, though full of color and interesting situations, lack dramatic inspiration. In his idealization of the underworld he has undoubtedly sounded a strong new note in Russian literature, yet he will hardly rank high in its annals, unless his best work is still to come. Admirable brief studies of Gorky will be found in Kropotkin, *Russian Literature* (London, 1905); Phelps, *Essays on Russian Novelists* (New York, 1911); and Persky, *Contemporary Russian Novelists* (Boston, 1913). Consult also Ossip Lourié, *La psychologie des romanciers russes* (Paris, 1905).

**GÖRLITZ**, gër'lits. A town in the Prussian Province of Silesia, capital of the circle of Görlitz, situated on the Neisse, 62 miles by rail east of Dresden (Map: Germany, F 3). It has still retained in part its old buildings and fortifications, though the old walls have been demolished and their places taken by modern walks and driveways. There are extensive modern quarters. Chief among the ecclesiastical buildings of Görlitz is the large Protestant church of St. Peter and St. Paul, originally built in the thirteenth century, rebuilt in the fifteenth century, and partly renovated after a fire at the end of the seventeenth. The church is a good specimen of late Gothic style and has a fine crypt and two modern towers. The chapel of the Holy Cross contains a model of the Holy Sepulchre at Jerusalem, made during the fifteenth century. Other noteworthy churches are the late Gothic Frauenkirche, dating from the fifteenth century; the Trinity, or Abbey, Church, dating from 1245 and restored in 1868; and the new Protestant Church, consecrated in 1901. The slightly Rathaus, built in the Gothic and early Renaissance styles, has a remarkable staircase and fine examples of wood carving. A massive bastion of the fifteenth century, well worthy of attention,

is now used as a guardhouse. Many fine examples of Renaissance architecture are also found among the private dwellings, and there are numerous monuments and fountains. The attractive municipal park contains a botanical garden and several statues, including one of Jakob Böhme, the mystic, who was born near Görlitz in 1575 and passed most of his life in this place. The municipality owns about 70,000 acres of forests and is accounted one of the wealthiest towns of Germany.

Among the educational institutions the most prominent are the two Realgymnasien and one classical Gymnasium, the seminary for female teachers, the municipal museum of antiquities, the municipal theatre, the municipal library, containing many valuable manuscripts and incunabula, and the library of the Upper Lusatian Scientific Society. The city is well provided with benevolent institutions as well as with art and scientific organizations. It is one of the most important industrial points of Silesia. The leading manufactures are cloth goods. There are also produced railway supplies, leather and leather manufactures, glass, tobacco, cars, chemicals, machinery, gold and silver wares, toys, cigars, and sausages. The retail trade is carried on to a large extent by coöperative stores. Pop., 1890, 62,135; 1900, 80,931; 1910, 85,806, mostly Protestants.

Görlitz, which bears the name of a Slavic village near which it rose, was founded about 1200. It received Magdeburg rights in 1303 and joined the league of the six towns of Upper Lusatia in 1340. From 1377 to 1396 it was the capital of the Duchy of Görlitz. In 1635 it passed to Saxony and was annexed to Prussia in 1815. Consult M. Kwiecinski, *Görlitz und seine Umgegend* (6th ed., Görlitz, 1899), and R. Jecht, *Notizen zur Geschichte der Stadt Görlitz bis 1600* (ib., 1909).

**GÖRLITZ TRIAL, THE.** A famous trial held in 1850 at Darmstadt, Germany, and pertaining to the mysterious death of a Countess Görlitz. It was asserted that her death was due to spontaneous combustion. Liebig and Bischoff declared that under no circumstances could a body in which the blood is circulating take fire. Consult Graff, "Ueber die Todesart der Gräfin Görlitz, nebst Gegenbeweis von Bischoff," in Henkes, *Zeitschrift für die Staatsarzneikunde* (Erlangen, 1850).

**GORMAN, ARTHUR PUE** (1839-1906). An American Democratic politician, born in Howard Co., Md., March 11, 1839. He was educated in the public schools and at 13 became a page in the United States Senate, which post he held for 14 years. He was collector of internal revenue in the Fifth District of Maryland in 1866-69. He was made general superintendent of the Chesapeake and Ohio Canal Company, and in 1872 its president. In the meantime he had been elected to the House of Delegates in Maryland in 1870; he held office until 1875, during the last part of his term serving as the Speaker. In 1875 he was elected State Senator and in 1881 United States Senator. By the grasp on parliamentary law which he had attained as a page, and his relentless methods, he quickly rose to a prominent position in his party. In 1884, as chairman of the Democratic National Committee, he was largely instrumental in electing Grover Cleveland President. He led the opposition to the Force Bill in 1889 and opposed the second nomination of Cleveland in

1892. Always an advocate of moderate protection, he became recognized as the leader of those among his party who favored that policy, and after the nomination of Bryan in 1896 an attempt was made to throw Gorman out of the party councils. This led to his defeat for reelection in 1899, but after a lapse of three years he was again in the Senate for a fourth term, and in absolute control of the Democratic organization as chairman of the caucus. He attempted to disfranchise the Maryland negroes in 1904, and was prominently mentioned as a candidate for President. He died June 4, 1906.

**GORMAN, WILLIS ARNOLD** (1814-76). An American politician and soldier, born near Flemingsburg, Ky. He was educated in law at the University of Indiana, was admitted to the bar in 1825, practiced law for a number of years, served first as a major (1846) and then as a colonel (1847) in the Mexican War, commanding a battalion in the battle of Buena Vista. He was a Democratic member of the House of Representatives from Indiana in 1849-53, was Territorial Governor of Minnesota from 1853 to 1857, and practiced law at St. Paul from 1857 to 1861. On the outbreak of the Civil War he entered the Federal army as a colonel of Minnesota volunteers and became a brigadier general of volunteers in September, 1861. He left the service in 1864 and subsequently lived in St. Paul, serving as city attorney from 1869 until his death.

**GORMAS, COUNT DE.** See LUNA, A. DE.

**GORNER GLACIER.** A large glacier in the Pennine Alps, lying on the north slope of Monte Rosa. It has a length of 9.4 miles and covers an area of 26.6 square miles, including the snow fields. The ice sheet averages about a mile in width. A fine view of the glacier is obtained from the Gornier Grat, a ridge rising from the right bank to a height of 10,290 feet.

**GOROSTIZA, GÖRÖ-STÉSA, MANUEL EDUARDO DE** (1789-1851). A Mexican statesman and playwright. He was born at Vera Cruz, of which city his father was Governor, and early acquired fame through his comedies, the first of which is said to have been written by him at the age of 12. Entering the Spanish army, he fought in the war against Napoleon and reached the rank of lieutenant colonel. Banished on account of his liberal ideas, he agitated in favor of Mexican independence in London. After the establishment of the Mexican Republic he served as Minister to England, France, and the United States, where he concluded several important political and commercial treaties. In Mexico he filled the posts of Minister of Treasury and Foreign Relations, and director of the National Library. A list of his works was published in the *Catálogo de autoridades de la lengua* of the Spanish Academy. They include: *Don Dieguito* (1820); *Indulgencia para todos* (1818); *El Jugador* (1820); *Contigo pan y cebolla* (1833).

**GÖRRES, GÉRRES, JOHANN JOSEF** (1776-1848). A German scholar and publicist. He was born at Coblenz, Jan. 25, 1776, studied at the University of Bonn, and, being of a very ardent temperament, threw himself into the revolutionary movement which then agitated Rhenish Prussia. He first dreamed of uniting the Rhenish provinces with France in pursuance of his ideal of a union of all civilized countries and advocated these ideas in two ephemeral newspapers. He, however, soon learned to detest Napoleon and, despairing of the cause of liberty,

from 1800 to 1806 taught physics at Coblenz, then was tutor at Heidelberg very successfully, lecturing first on æsthetics and then on older German literature. In 1808 he returned to Coblenz and for two years (1814-16) edited another newspaper, the *Rheinischer Merkur*, the most important political journal published in Germany at that time, which breathed the most ardent German patriotism. But before long his opinions underwent another radical change, and, compelled to flee because his political views were not acceptable to the government, he took up a mystic and symbolic kind of religion in the same enthusiastic way. Always a Roman Catholic, he now became the church's aggressive champion. In 1826 he was called from exile in Switzerland to be professor of history in the University of Munich, and the next 20 years were the most productive of his life, during which he poured forth a mass of brilliant polemic papers on questions of the day. He died at Munich, Jan. 27, 1848. His principal publication is *Die christliche Mystik* (1836-42), which, though doubtless intended to set forth only views acceptable to the Roman Catholic church, as a matter of fact was regarded with so much aversion that it required all the King of Bavaria's influence to prevent its being put on the Index. His numerous political writings were collected (1854-60), and also his letters (1858-74). In English have appeared *Germany and the Revolution* (1820) and *The Stigmata: A History of Various Cases* (a part of his *Mystik*, 1883). Consult his biography by Galland (2d ed., Freiburg, 1876), and Franz Schultz, *Joseph Gorres, als Herausgeber, Literaturhistoriker, Kritiker* (Berlin, 1902).

**GORRESIO**, gôr-râ'zê-ô, GASPARE (1808-91). An Italian Sanskrit scholar, born at Bagnasco, Piedmont, and educated at Turin and Vienna. He was professor in the military school at Turin from 1832 to 1838 and then went to Paris to study Sanskrit under Burnouf and later continued his linguistic studies in London. In 1852 the first chair of Sanskrit in Italy was established for him at Turin, and in 1859 he became librarian of the National Library in that city. His principal work, upon which he was engaged for nearly 30 years, is an excellent Italian translation of the *Râmâyana* (10 vols., 1843-58). He published also the *Uttarakanda, testo con note secondo i codici della recensione Gaudana* (1867). For a brief biography, consult the article of Pizzi in the *Atti della Reale Accademia di Scienze*, vol. xlii (Turin, 1907).

**GORRINGE**, gôr'rinj, HENRY HONEYCHURCH (1841-85). An American naval officer. He was born in the island of Tobago, West Indies, the son of an English clergyman, and emigrated to New York in 1858, where he entered the merchant-marine service and by 1862 was master of a sailing vessel. In that year he entered the United States navy as master's mate. He was attached to the Mississippi squadron under Commodore Porter, and by 1865, through successive promotions for bravery and good service, attained the rank of acting volunteer lieutenant commander. In 1868 he was commissioned lieutenant commander in the regular service. He commanded the *Portsmouth* in the South Atlantic squadron from 1869 to 1871 and was engaged at the Hydrographic Office in Washington from 1871 to 1876, when he was sent with the *Gettysburg* to the Mediterranean Sea. In 1879 he was assigned the task of transporting from Alexan-

dria, Egypt, to New York the obelisk popularly known as "Cleopatra's Needle," which the Khedive Ismail Pasha had presented to the United States. Gorrington accomplished the task with complete success, surmounting great engineering difficulties and showing considerable ingenuity in the contrivances he invented for moving the monolith. He resigned his commission soon afterward in consequence of a reprimand received from the Secretary of the Navy for too free criticism of naval matters and during the remainder of his life was engaged in extensive shipbuilding projects. He published *Egyptian Obelisks* (1882).

**GORSE**. See FURZE.

**GORST**, SIR JOHN ELDON (1835-1916). An English legislator, born at Preston and educated at St. John's College, Cambridge. He was civil commissioner of Waikato, New Zealand, from 1861 to 1863. In 1866-68 he was in Parliament as Conservative member for Cambridge University, from 1875 to 1892 represented Chatham, and from 1892 to 1906 sat again for Cambridge. He failed of reelection in the latter year. He was appointed Solicitor General in 1885, and afterward was successively Undersecretary of State for India (1886-91); Deputy Chairman of Committees, House of Commons (1888-91); Financial Secretary to the Treasury (1891-92); rector of Glasgow University (1893-94); and vice president of the committee of the Council on Education from 1895 to 1902. After 1903 he actively opposed Mr. Chamberlain's tariff-reform proposals. He wrote *The Children of the Nation: How their Health and Vigor should be Promoted by the State* (1907) and *New Zealand Revisited* (1908).—His son, SIR ELDON GORST (1861-1911), was educated at Eton and at Trinity College, Cambridge. After filling various posts he was appointed Secretary of Legation (1901), while acting as financial adviser to the Egyptian government (1898-1904), and subsequently he was Assistant Undersecretary of State for Foreign Affairs (1904-07), and British Agent and Consul General in Egypt (1907-11).

**GORTCHAKOFF**, gôr'châ-kôf'. A Russian family, tracing its ancestry to Vladimir the Great and Rurik.—Prince PETER GORTCHAKOFF, Governor of Smolensk, defended that town for two years (1609-11) against Sigismund III of Poland, until it was taken by storm.—Prince DMITRI GORTCHAKOFF (1756-1824) was a celebrated Russian poet and wrote odes, satires, and epistles.—Prince ALEXANDER GORTCHAKOFF (1764-1825) served under his uncle Suvaroff in Turkey and Poland, displayed great courage at the capture of Praga, a suburb of Warsaw, and was made lieutenant general in 1798. In the campaign of 1799 he commanded under Korsakoff at Zurich. He was made military governor of Viborg, repulsed Marshal Lannes at Heilsberg, and commanded the right wing of the Russian army at the battle of Friedland (1807). Appointed Minister of War in 1812, he filled this post to the end of the French War, when he was made general of infantry and member of the Imperial Council.—Prince ANDREI GORTCHAKOFF (1768-1855) served in 1799 as major general under Suvaroff in Italy and commanded in 1812 a division of grenadiers at Borodino, where he was wounded. In the campaign of 1813-14 he commanded the First Corps of Russian infantry and distinguished himself at Leipzig and Paris. He was made general of infan-

try in 1819 and in 1828 retired from active service.—Prince PETER GORTCHAKOFF (1790–1868) fought against Napoleon in 1807 and 1817, later served in the campaigns of 1813 and 1814 in Caucasia under General Yermoloff. He took part in the Russo-Turkish War of 1828–29 and was one of the signers of the preliminaries to the Treaty of Adrianople. In 1843 he was appointed Governor-General of Western Siberia, and occupied that important post until 1851, when he retired from active life. On the outbreak of the Crimean War, however, he returned to service, and at the battle of the Alma commanded the left wing of the Russians. He also took part in the battle of Inkerman.—Prince MIKHAIL GORTCHAKOFF (1795–1861), brother of Peter, began his military career as an officer of artillery and distinguished himself in 1828 at the siege of Silistria and at Shumla. In 1831 he gave proofs of extraordinary valor in the battle of Ostrolenka and at the taking of Warsaw. He was appointed general of artillery in 1843 and military governor of Warsaw in 1846. In 1853 he commanded the Russian forces in the Danubian Provinces, crossed the Danube at Braila, March 23, 1854, occupied the frontier region of Bessarabia, and in 1855 directed the defense of Sebastopol. As a reward for his services in this unsuccessful but still brilliant defense, Prince Gortchakoff was appointed by the Emperor Alexander II Governor of the Kingdom of Poland and was for several years a wise and conciliatory representative of his youthful Emperor at Warsaw. He died May 30, 1861.

Prince ALEXANDER MIKHAILOVITCH GORTCHAKOFF (1798–1883), a cousin of the preceding, entered the diplomatic service and became one of the most skillful and influential diplomats in Europe. He was an attaché in the suite of Count Nesselrode at the congresses of Laibach and Verona, Secretary of the Russian Embassy in London in 1824, chargé d'affaires at Florence in 1829, counselor of the Russian Embassy at Vienna in 1832, and in 1841 was sent as Plenipotentiary to Stuttgart, where he negotiated the marriage of the Grand Duchess Olga, daughter of Emperor Nicholas, with Crown Prince Charles of Württemberg. He was accredited Ambassador to the German Bundestag at Frankfurt in 1850, and there first met Bismarck. He represented Russia at Vienna from 1854 to 1856, and so conducted affairs that Alexander II made him Minister of Foreign Affairs on the retirement of Nesselrode, April 15, 1856. At the very outset hostility to Austria seemed to be the impelling motive of his policy. "Austria," he declared, "is no state, only a government," and he shaped his policy in accordance with his dictum, after the disastrous issue of the Crimean War, "La Russie ne boude pas, elle se recueille" (Russia bears no grudge; she collects herself). He was unquestionably successful in restoring the prestige of Russia. In 1863 he was made Chancellor of the Empire. During the Civil War in the United States he maintained a friendly attitude towards the North, a fact which restrained France and England from open countenance of the Confederacy. By bringing Russia into accord with Prussia in 1863 he was able to resist the attempted interferences of foreign powers in behalf of the Polish insurgents. He cultivated friendly relations with Bismarck while the latter was Prussian Ambassador at St. Petersburg, and the good understanding between the two governments made

possible the attainment of German unity through Prussia's drastic course, while Russia reaped her reward by being enabled to break the terms of the Peace of Paris, extorted from Russia at the close of the Crimean War in 1856, to the extent of gaining control of the mouths of the Danube and admitting the Russian war fleet to the Black Sea. After 1873 Gortchakoff ceased to view with favor the much talked of alliance of the three emperors, because of the increasing power of Germany. He was the guiding spirit of Russian policy in the war with Turkey in 1877–78, and the diplomatic consequences of that war widened the breach between the two great chancellors and their governments. Gortchakoff felt that Russia had been deserted by Germany in the negotiations at Berlin, and he never forgot it. He was the author of the Franco-Russian *entente*, to which Bismarck responded by the Triple Alliance. De Giers succeeded Gortchakoff as Minister of Foreign Affairs in 1882, but the latter remained Chancellor until his death at Baden-Baden, March 11, 1883. Prince Gortchakoff's biography, by Charles Marvin, was published in London (1887). Some interesting observations on Gortchakoff and his diplomatic methods are to be found in Bismarck's *Autobiography*, trans. by Butler (New York, 1899). Consult also Klaczko, *The Two Chancellors*, trans. by Tait (New York, 1876), and Alfred Rambaud, *A Popular History of Russia*, vol. iii (Boston, 1882). See RUSSIA; RUSSO-TURKISH WAR.

**GORTON.** A suburban municipality of Manchester (q.v.), Lancashire, England. Pop., 1901, 26,550; 1911, 40,578.

**GORTON, SAMUEL** (1592–1677). One of the founders of Rhode Island, born at Gorton, England. For a time he was a clothier in London; but having adopted radical religious opinions, he left in 1636 for Boston, Mass. There his participation in religious discussions led to trouble; so he went to Plymouth and began to preach; but in 1638, leading the opposition to certain political measures of Governor Prence, he was banished from Plymouth. He then removed to Pocasset (now Portsmouth), Aquidneck (now Rhode Island). When William Codrington became Governor, Gorton was denied the island, but he found protection at Providence with Roger Williams (1640). Thence in 1642 he went to the other side of Narragansett Bay and bought the lands owned by the Indian chief Miantonomi at Shawomet, now Old Warwick. His claim was disputed by other Indian chiefs, and, the dispute being referred to the Boston authorities, 40 soldiers were sent, who took Gorton and eight of his people prisoners. They were tried at Boston on a heresy charge and sentenced to hard labor in chains (1643). Five months afterward (March, 1644) they were released and at once left the Colony. Gorton then returned to England and obtained from the Parliament Commissioners a mandate protecting his land claim. He returned in 1648, named the place Warwick, and thenceforward lived in peaceful possession. In 1651–52 he was president of Providence and Warwick, and he held numerous other offices. He was an author and published *Simplicities Defense Against Seven-Headed Policy* (1646; reprinted in Peter Force, *Collection of Historical Tracts*, Washington, 1846); *An Inocorruptible Key Composed of the CX. Psalm Wherewith You May Open the Rest of the Holy Scriptures* (1647); *An Antidote Against the Common*

*Plague of the World* (1657); and other works. He died at Warwick between Nov. 27 and Dec. 10, 1677. A sect of which he was the founder, though few in number, existed for about 100 years. Its distinguishing tenets were contempt for the regular clergy and the outward forms of religion, and the belief that the true believers were so united to God that they shared in His perfection, and for them heaven and hell were practically non-existent. The emphasis laid on negations by Gorton's followers led to their being called the Nothingarians. Consult Janes, *Samuel Gorton* (Providence, 1896), and A. Gorton, *Life and Times of Samuel Gorton* (Philadelphia, 1907).

**GORTYNA** (Lat., from Gk. Γόρτυνα). An ancient city of importance on the southern side of the island of Crete, now called Gortyn. It stood on the banks of the small river Lethæus (Mitropolipotamo), at a short distance from the sea, with which it communicated by means of its two harbors, Metallum and Lebena. It possessed temples of Apollo Pythius, Artemis, and Zeus. Near the town was the famous fountain of Sauros, inclosed by fruit-bearing poplars; and not far from this was another spring, overhung with an evergreen plane tree which in popular belief marked the scene of the amours of Jupiter and Europa. Gortyna was the second city in Crete, next to Cnosus in importance. According to tradition, Cnosus and Gortyna combined to subdue the island and then quarreled with each other. Neither plays a conspicuous part in the history of Greece. Under the Romans Gortyna became the metropolis of Crete. Some ruins may still be traced at the modern village of Hagii Deka. An important inscription (Greek) was discovered here in 1884, by Halbherr and Fabricius, in the bed of a mill stream. The main body of the inscription was on a wall 27 feet long and 5 feet high. Taken with two fragments previously discovered in 1857 and 1859, by French archaeologists, and 80 others which came to light in 1885, the inscription forms a practically complete code of laws, bearing on the family relations in regard to such matters as inheritance, marriage, divorce, and adoption, and on matters of bargain and sale. The inscription is written alternately from right to left and left to right (*boustrophedon*) in a peculiar local alphabet and in the local dialect. In spite of these marks of antiquity it is not likely that the main inscription can be dated much earlier than 400 B.C.; the fragments discovered in 1885 may belong to the seventh century B.C. There is a cast of the main inscription in the Cambridge (England) Museum of Classical Archaeology. Consult: Bucheler and Zitelmann, *Das Recht von Gortyn* (Frankfurt, 1885); Baunack, *Inscript von Gortyn* (Leipzig, 1885); Merriam, in *American Journal of Archaeology*, vols. i and ii (Baltimore, 1885-86), with translation and notes; Gardner-Jevons, *Manual of Greek Antiquities* (2d ed., London, 1898); Wyse, in Whibley's *Companion to Greek Studies* (Oxford, 1905); Lipsius, *Zum Recht von Gortyns* (Leipzig, 1909); Kohler and Ziebarth, *Das Stadtrecht von Gortyn und seine Beziehungen zum gemeingriechischen Recht* (Göttingen, 1912). For excavations at Gortyna in 1912 which yielded two more blocks of the great inscription, consult Tonks, "Archæology," in *The New International Year Book* (1912). See COMPARETTI.

**GORTYNIAN LAW CODE.** See GORTYNA.

**GÖRTZ**, gërts, GEORG HEINRICH VON. See SCHLITZ.

**GORUP-BESANEZ**, gō'rup bâ-zâ'nêts, BABON EUGEN (1817-78). A German chemist, born at Graz and educated in that city and at Vienna, Padua, Munich, and Göttingen. He was appointed assistant in 1849 and regular professor of chemistry at Erlangen in 1855. His researches on zoöchemical analysis are important, and his work entitled *Anleitung zur qualitativen und quantitativen zoöchemischen Analyse* (3d ed., 1871) is very valuable. His principal publication is the *Lehrbuch der Chemie* (vol. i, 7th ed., 1885; vol. ii, 6th ed., 1881; vol. iii, 4th ed., 1878), which has been translated into French and several other languages.

**GÖRZ**, gërts, or **GÖRITZ**, gër'rits. The capital of the Austrian Crownland of Görz and Gradisca, one of the coast districts, charmingly situated in a fruitful plain on the left bank of the Isonzo, about 35 miles north-northwest of Trieste (Map: Austria, C 4). It is the seat of an archbishop. Among its principal buildings are the cathedral of the seventeenth century, with a beautiful sacarium; the church of St. Ignatius and college of the Jesuits, the latter used as barracks; the Archbishop's palace; and government buildings. Above the town rises the dilapidated old castle of the former counts of Görz, now used as barracks; and to the north lies the Franciscan monastery of Castagnavizza, with the graves of Charles X of France, who died in Görz in 1836, of the Duc d'Angoulême, and of the Comte de Chambord. Owing to its fine climate, it has become a favorite health resort, and is now called "the Nice of Austria." Its institutions include a gymnasium, a theological school, a teachers' seminary, an agricultural school, an agricultural-chemistry experiment station, and a public library. Görz has manufactures of silks, cotton, thread, dyed goods, breadstuffs, pottery, candles, kindling wood, leather, matches, candles, paper, and soap, and a thriving trade in vegetables, candied fruits, and wine. Pop., 1900, 25,432; 1910, 30,995.

**GÖRZ AND GRADISCA**, grâ-dis'kâ. A crownland and princely earldom of the Austrian portion of Austria-Hungary, bounded on the north by Carinthia, east by Carniola, south by the Adriatic and the districts of Trieste and Istria, and west by Italy. Area, 1140 square miles. It is mostly a mountainous region. The southwestern part, on the Adriatic, is wholly arable and very fertile, but has no good harbors. In the north the Julian Alps cross in a southeasterly direction, with the Triglav group (9394 feet) rising on the east boundary; in the west the Venetian Alps extend southward, forming most of the west boundary, with Monte Canin (8469 feet) as the highest peak. The two important rivers are the Isonzo, which empties into the Adriatic, and the Timavo, which flows into the Gulf of Trieste. Agriculture and culture of the vine are the leading industries. Silk is also produced in the south. Wheat, barley, maize, rice, buckwheat, and hay are raised. Capital, Görz. The local diet has 22 members. The crownland sends five members to the Lower House of Austria. Pop., 1900, 232,897; 1910, 261,721. The inhabitants are almost wholly Roman Catholics. The district came into the possession of Austria in 1500, on the extinction of a line of counts of Görz and Gradisca, who had ruled for some centuries.

**GÖSCHEL**, gë'shel, KARL FRIEDRICH (1784-

1862). A German jurist and philosopher. He was born at Languensalza and was educated for the bar at Leipzig. In 1845 he was appointed president of the consistory for the Province of Saxony, Prussia, but was compelled to resign that position after the revolution of 1848. He was not only a scholar and theorist, but also a practical legislator, both in ecclesiastical and secular matters. Conservative in his religious views, Gûschel exerted considerable influence upon the Protestant church in his day and, above all, was instrumental in establishing the relation between theology and the Hegelian philosophy. His works include: *Aphorismen über Nichtwissen und absolutes Wissen* (1829); *Der Monismus des Gedankens* (1832); *Von den Beweisen für die Unsterblichkeit der menschlichen Seele* (1835); *Vorträge und Studien über Dante* (1863).

**GOSCHEN**, gô'shen, GEORGE JOACHIM GOSCHEN, first Viscount (1831-1907). An English statesman. He was educated at Rugby and Oriel College, Oxford. Entering the mercantile firm of Fröhling and Goschen, he paid especial attention to finance and in 1850 became a director of the Bank of England. A Liberal member of Parliament for London from 1863, he took an active share in throwing open the universities to dissenters and in bringing about the abolition of religious tests. He was reelected in 1865. He became a privy counselor and vice president of the Board of Trade in 1865, and in the following year Chancellor of the Duchy of Lancaster and Cabinet Minister, but retired with the Russell ministry in June of that year. On Gladstone's accession to power in 1868, Goschen was appointed president of the Poor Law Board and in 1871 First Lord of the Admiralty. He retired from office with his party in 1874, and in the election of this year he was the only Liberal candidate returned from the city of London. In the same year he became lord rector of Aberdeen University. Two years later he and M. Joubert went as delegates to Cairo, where they planned with the Khedive the conversion of the Egyptian debt. In 1880 and 1881, as special Ambassador to the Porte, Goschen lent his services to the settlement of the Græco-Montenegrin boundary. Because of his opposition to Gladstone on the extension of the franchise and on home rule for Ireland, he abandoned the Liberal party for that of the Liberal Unionists (q.v.) in 1886 and accepted the office of Chancellor of the Exchequer in Lord Salisbury's government after the resignation of Lord Randolph Churchill. In 1895 he again became First Lord of the Admiralty; he resigned in 1900, was created Viscount, and entered the House of Lords. He became rector of Edinburgh University in 1890 and chancellor of Oxford University in 1903. He published *The Theory of Foreign Exchanges* and a life of his grandfather, G. J. Gûschen, the noted German publisher (1903).

**GOSCHEN**, SIR WILLIAM EDWARD (1847- ). An English diplomat, brother of the first Viscount Goschen. He was born in London, was educated at Rugby and Oxford, and entered the diplomatic service as attaché in 1869. He was Third Secretary at Buenos Aires (1873) and Paris (1875) and Second Secretary at Rio de Janeiro (1877), accompanied his brother to Constantinople in 1880, and served as Secretary of Legation in Peking (1885), Copenhagen (1888), Lisbon (1890), Washington (1893), and St. Petersburg (1894). He was Ambassador at

Belgrade in 1898-1900, at Copenhagen in 1900-05, and, after three years in Vienna, was in 1908 promoted to the even more important post of Berlin. At the opening of the great European conflict of 1914 he returned to England.

**GOS/HAWK** (AS. *gôshafoc*, goose hawk, from *gôs*, goose + *hafoc*, *heafoc*, hawk). A genus of falcons (*Astur*) containing five or six species, distinguished from the true falcons by a lobe or festoon instead of a sharp tooth, on the edge of the upper mandible, and by the shortness of the wing, which reaches only to the middle of the tail. It is more closely allied to the sparrow hawks. The species to which the name "gos-hawk" originally belonged (*Accipiter palumbarius*, or *gentilis*) is very widely diffused over Europe, Asia, and the north of Africa, chiefly inhabiting hilly and wooded regions. It is now very rare in Great Britain, particularly in England. Although one of those that were called *ignoble birds of prey*, it was much used for falconry, being easily trained, and very successful in catching such game as is confined to the ground. The goshawk was thus flown at hares, rabbits, pheasants, partridges, etc. It was also flown at geese, whence the name "goose hawk." It ordinarily seeks its prey by flying near the ground and can remain a very long time on the wing. It follows its prey in a straight line, not rising in the air to descend upon it, like the falcons; and when baffled by the object of pursuit entering a wood and hiding itself in some covert, will perch on a bough and await its reappearance with wonderful patience for many hours. Its flight is very rapid. The goshawk builds a large nest in trees. The female, much larger than the male, is about 2 feet in entire length.

The American goshawk (*Astur atricapillus*) differs from that of the Old World, being altogether a larger and handsomer hawk. The upper parts are dark bluish-slate color, while underneath it is whitish, closely barred, or vermiculated with fine zigzag lines of brown. The young birds have a much less handsome plumage. The goshawk is chiefly a winter visitor in the northern United States, but breeds in the Rocky Mountains from Colorado northward. It is the most abundant of the birds of prey in Alaska, where many remain through the winter, and subsists partly by robbing the Eskimo hunters' snares, though mainly by capturing ptarmigan for itself. See PLATE OF FALCONS AND FALCONRY.

**GO'SHEN**. The name of a land given by Pharaoh to Jacob and his family when they came to Egypt, and occupied by their descendants until the Exodus (Gen. xlv. 10, xlv. 28, 34, xlvii. 27, 1, 8; Ex. ix. 26). According to Gen. xlv. 34, Goshen was outside of Egypt. This is also suggested by Josh. x. 41, xi. 16, where the land of Goshen is spoken of in connection with the Negeb (q.v.) and the Philistine Shephelah as a part of the conquests of Joshua. The Greek version rendered the name *Péseu*, *Gesem*, evidently identifying it with the Kesem, or Kes, of Ptolemaic times, also called the Arabian nome, with its capital at Phakusa, the Egyptian pa-Sept, the modern Saft el Henneh. Naville, Müller, and Wiedemann accept this view and look for the land of Goshen in the district around Saft el Henneh, east of the canal Abû'l Menagge and extending north of the Wadi Tumilat so as to include both the twentieth and the eighth nome with Bubastis, Belbeis, and Abasseh. It is not improbable, however, that this district,

which in the time of Seti I (1319-10 B.C.) was a marshland, formed only the part of Goshen that was nearest to Egypt, and that the name was used by the Hebrews to designate the whole country between the Brook of Egypt (Wadi el 'Arish) and the Nile delta. As the name "Mizraim" (Egypt) was also employed so as to include this region, Goshen might be said to be in Egypt in the wider sense as well as outside of Egypt in a narrower sense. When it is described as "the best of the land" (Gen. xlvii. 6, 11), this is to be understood as referring to the needs of a pastoral or seminomadic people. Consult W. Max Müller, *Asien und Europa nach den ägyptischen Inschriften* (Leipzig, 1893); id., art. "Goshen," *Encyclopædia Biblica* (New York, 1901); Naville, *The Shrine of Saft el Henneh and the Land of Goshen* (London, 1888); Wiedemann, in Guth's *Kurzes Bibelwörterbuch* (Tübingen, 1903); J. G. Duncan, *Exploration of Egypt and the Old Testament* (New York, 1909); H. Brown, *The Land of Goshen and the Exodus* (2d ed., London, 1912).

**GOSHEN.** A city and the county seat of Elkhart Co., Ind., 110 miles east of Chicago, Ill., on the Lake Shore and Michigan Southern and the Cleveland, Cincinnati, Chicago, and St. Louis railroads, and on the Elkhart River (Map: Indiana, F 1). The city contains Goshen College, a Carnegie library, city hospital, and a fine high-school building. It has important agricultural and lumber interests and extensive manufactures, which include flour, rubber goods, ladders, iron, condensed milk, buggies and wagons, steel tanks, underwear, machinery, sash and doors, veneering, furniture, and farm implements. Goshen is governed by a mayor, elected every four years, and a unicameral council. The water works and an electric-light plant are owned and operated by the city. Pop., 1900, 7810; 1910, 8514; 1914 (U. S. est.), 8813.

**GOSHEN.** A village and the county seat of Orange Co., N. Y., 60 miles northwest of New York, on the Erie and the Lehigh and New England railroads (Map: New York, A 1). The centre of an agricultural region, it has a large trade in milk and cheese. There are cut-glass works, foundries, a road-cart factory, and a cider mill. The village contains a public library, a hospital, and a sanitarium. Goshen was settled in 1714 and first incorporated in 1809. The government, under a general Act of 1897, is vested in a president and board of four trustees, who are elected at the annual corporation meeting. The village owns and operates its water works. Pop., 1900, 2826; 1910, 3081.

**GOSIUTE**, gó'shi-tó't (from *Gossip*, their chief + *Ute*). A Shoshonean tribe, formerly ranging west of Great Salt Lake, Utah, and later assimilated by the Piute (q.v.).

**GOSLAR**, gó'slár. An ancient Imperial city of Germany, in the Prussian Province of Hanover, situated on the Gose at the foot of the Rammelsberg, about 35 miles south of Brunswick (Map: Prussia, D 3). Its ancient buildings give it a very mediæval appearance. These include the Zwinger, a tower with walls 20 feet thick; the Gothic Rathaus, with a valuable collection of old books, paintings, and other antiquities; the tailors', butchers', and bakers' guild houses, the Romanesque twelfth-century church of the Neuwerk Monastery, with good mural paintings; the Frankenberg Church, built at the beginning of the twelfth century and restored in 1873, with tombstones and

sculptures; and the cathedral chapel, with a splendid altar. It was formerly the vestibule of the historical cathedral of St. Simon and St. Jude, founded in 1045 and destroyed in 1820, and contains many relics of interest to the antiquary. The Kaiserhaus, the most ancient secular building in Germany, built in 1039, is a restored palace founded by Henry III. Its large Imperial hall is enriched with historical frescoes by Wislicenus and contains an ancient Imperial throne dating from the twelfth century. The double chapel of St. Ulrich, a portion of the original building, holds the tomb of Henry III, with his heart. Among its institutions are a gymnasium, a teachers' institute, and several sanitariums.

The chief industry of Goslar is mining. It manufactures polished marble, matches, chemicals, starch, playing cards, cigars, hats, dyes, cut glass, brandy, and beer. In the vicinity are situated a number of ponds from which ochre dye is obtained. The Rammelsberg Mountain (2040 feet) has been mined for centuries, produces silver, copper, lead, zinc, and gold ores, and is a source of much interest to tourists. Pop., 1900, 16,403; 1910, 18,909, chiefly Protestants. Goslar was founded probably early in the tenth century and soon became important on account of its rich mineral deposits. It was a favorite place with the Saxon and Franconian emperors and the seat of many diets. For its adherence to the Hohenstaufen it was destroyed by Otho IV in 1204, but it recovered its prosperity after joining the Hanseatic League. It suffered during the Thirty Years' War and was burned in 1728 and 1780. Attached to Hanover in 1816, it finally became Prussian in 1866.

**GOSLAWSKI**, gó-sláv'ské, MAURYCY (1802-34). A Polish poet, born in Podolia. He was educated at Kremenetz and composed his famous war songs as a soldier during the revolution of 1830. These were subsequently collected and published under the title *Poezya Ulana polskiego poświęcona Polkom M. Goslawski* (Poems of a Polish Uhlan, 1833). Sent as an emissary to Galicia from Paris, whither he had fled in 1833, he was arrested by the Russian authorities and imprisoned at Stanislaw, where he died, and where a monument was erected to his memory in 1875. His complete works were published by Brockhaus in 1864 under the title of *Poezye*.

**GOSNELL**, R. EDWARD (1860- ). A Canadian archivist and author. He was born at Lake Beauport, Province of Quebec, was early a public-school teacher and in newspaper work, and went in 1888 to British Columbia, where, after two years on the staff of the *Vancouver News-Advertiser*, he was appointed a commissioner to exhibit the products of the province. In 1893 he became librarian and secretary of the provincial bureau of statistics, and later he edited the *Victoria Colonist* for some years. He was made provincial archivist and secretary of the British Columbia Forestry Commission, was actively interested in the cause of Imperial federation, becoming a member of the British Empire League in British Columbia, and in 1907 was a delegate to the Conference on Education in London, England. He edited the *British Columbia Year Book*. His publications include *Some Practical Phases of a Great Question* (1901) and, with R. H. Coats, *The Life of Sir James Douglas* (1905), in the "Makers of Canada Series."



**GOSNOLD, BARTHOLOMEW** (?-1607). An English navigator and one of the earliest explorers of New England. He sailed for America in March, 1602, with a party of colonists in the *Concord*. The expedition seems to have been supported by Sir Walter Raleigh. Gosnold made land somewhere on the coast of Maine, sailed south along the coast, and discovered and named Cape Cod, Martha's Vineyard, and Elizabeth Island. This last, now known as Cuttyhunk, was made a base for trading operations, which were carried on in Buzzard's Bay for a few weeks. The idea of a permanent settlement, to found which was one of the objects of the voyage, was soon abandoned, and in July the *Concord* was once more in England with a cargo of cedar, furs, and sassafras. In 1606—largely through Gosnold's efforts—an association of London and West of England merchants obtained a charter from James I for colonizing Virginia. Three ships sailed under Capt. Christopher Newport (1607). The expedition discovered and named Cape Charles and Cape Henry and founded the settlement of Jamestown. Gosnold was among those appointed by the King to the council of the Colony, and he was one of the many who succumbed to illness in the early months of the experiment. He died on Aug. 22, 1607. For the contemporary account of Gosnold's voyages and the settlement of Virginia, consult Arber's edition of the *Works of John Smith*, in the "Scholar's Library" (London, 1884), and Stevens's reprint of Brereton, *Brief and True Relation of Gosnold's Voyage* (ib., 1901). See CUTTYHUNK.

**GOSPEL** (AS. *godspel*, *godspell*, OS. *god-spell*, OHG. *gotspel*, the *o* being originally long, and meaning thus *gōd*, good + *spel*, tidings, a translation of Gk. *εὐαγγέλιον*, *evangelion*, good tidings, from *eu*, well + *εγγέλλειν*, *angellein*, to announce. Through the shortening of the *o*, in popular speech, before the three consonants, the word took the form *gōdspel*, God story, the story of Christ. To this form the OS. and OHG. belong). The word used to denote (1) the message of salvation given to the world by Jesus Christ, and (2) the historical record of this message as contained in the first four books of the New Testament, so that each of these books is designated a Gospel, and the collection is known as the Gospels. The term, as used in the earlier books of the New Testament, has an active sense, best expressed by the phrase "the preached gospel." This was due to the missionary character of the initial proclamation which was given by the Apostles to the message of salvation. It is frequently so used in Paul's Epistles (e.g., 1 Thess. iii. 2; Rom. i. 1-3, 9, 16; Phil. i. 5, 12, ii. 22, iv. 3). In the later books the term is used sometimes in a technical sense, denoting the historical record of this salvation message (e.g., Mark i. 1), or even the message itself as an article of faith and confession (e.g., Rev. xiv. 6). This technical sense was fully acquired by the end of the second century. Its primary sense is seen in such passages as Mark i. 14, 15, xiii. 10, xiv. 9; Matt. iv. 23, ix. 35, xxiv. 14, xxvi. 13; Gal. i. 11, ii. 2; 1 Cor. xv. 1; 2 Cor. xi. 7; Rom. x. 16.

The following article naturally confines itself to the term as denoting the historical records of the Gospel message, the New Testament books commonly known as the Gospels. Of these Gospels, the first three (Matthew, Mark, Luke)

cover practically the early portion of Jesus' life, i.e., His ministry in Galilee and the north, together with the close of His life in Jerusalem, recording largely the same events and reproducing largely the same teachings. For this reason they are technically known as the *Synoptic Gospels*, and the question of their literary relation to one another and to common and specific sources is known as the *Synoptic Problem*. Their origin dates within generally the same period, say from 65 to 80 A.D. The Fourth Gospel (John) covers the later portion of Jesus' life—i.e., His ministry in Judæa and Jerusalem, not only on the occasion of His visits to the city before and at the close of His Galilean ministry, but especially during His closing ministry in that city and region—recording events and reproducing teachings largely different from those given in the Synoptic Gospels. For this reason the literary relation of the Fourth Gospel to the Synoptic Gospels constitutes in itself a specific problem known as the *Johannine Problem*, or the Problem of the Fourth Gospel. The origin of the Fourth Gospel dates from a period much later than those of the Synoptists, say about 90 A.D. The discussion of these two problems has enlisted the interest of most New Testament scholars and has really gathered around itself the most significant New Testament work which has been done in the last 50 years. More definitely stated, these problems are as follows:

**I. Synoptic Problem.** Our first three Gospels present such striking identities in their order of narrative and in their use of word, phrase, and continued statement, and at the same time such striking differences in these respects, that we are compelled to ask what theory of their origin will account for these phenomena. The following theories have been propounded: (a) the *Successive Dependence Theory*, viz., that the evangelists made use of one or more of the Gospels already written, so that one of the Gospels is the first and original Gospel—a second writer using the first, and the third using one or both of his predecessors. This is the oldest view, having practically originated with Augustine, and has been worked out into every possible modification. (b) the *Documentary Theory*, viz., that all three Gospels to some extent made use of a preëxisting written source. This theory came from ideas suggested by Le Clerc (1716) and was later taken up by Priestly (1777) and finally definitely formulated by Lessing (1778). This also has received many modifications, according to the view held as to the character of the original document and also according to the way this theory was combined with the first. (c) the *Oral Theory*, viz., that all three Gospels made use of the common oral tradition, which had become fixed by use. This was first suggested by Herder (1797) and Eckermann (1806), but fully formulated by Gieseler (1818). It has also been variously modified, according as there have been held to enter into the oral sources written sources as well, or as the Gospels have been held to have undergone various recensions which the evangelists have used in varied combinations.

The conclusions most generally accepted by critics to-day lie within the general sphere of the Documentary Theory, though they involve elements of each of the others. In substance they are, that behind our present canonical



Gospels lay two fundamental written sources: one a collection of sayings of Jesus, known as the *Logia* of Matthew—referred to to-day by the more general term *Quelle* (Source), represented by the symbol *Q*—and present most conspicuously, if not exclusively, in our first and third Gospels; the other a narrative of the events of Jesus' ministry, which is practically, if not absolutely, identical with our second Gospel. Besides these main sources, it is held that the writers of the individual Gospels had access to special sources peculiar to themselves; while the writer of the third Gospel is held by some to have made use of the first as well as the second, though there are others who account for the material common to the first and third Gospels on the theory that they made use of common documents apart from *Q* and not accessible to the second Gospel. Recently the theory has been advanced in Germany that the two main documents referred to above are not primary in character, but composite results of multiple sources whose origin is often, if not always, impossible to trace.

II. **The Problem of the Fourth Gospel.** Generally the problem has been centred on the contrasts disclosed between the Fourth Gospel and the Synoptics. The narrative scheme of the Fourth Gospel differs from that of the Synoptics, not only in the portion of the ministry which it specially covers, but in the shifting of incidents common to both schemes; while incidents are introduced in the Fourth Gospel the omission of which on the part of the Synoptics is difficult to understand, and others are omitted which would be reasonably expected on the part of the Fourth Gospel. In the discourses of Jesus there is an even more radical difference. (a) The Synoptics present the discourses as simple talks on the level of everyday speech; the Fourth Gospel as involved discourses beyond the range of ordinary speech. (b) The Synoptics give the discourses largely in the form of parable—as the Sower, the Lost Sheep, the Prodigal Son; the Fourth Gospel gives them largely in the form of allegory—as the Water of Life, the Light of the World, the Good Shepherd. (c) In the Synoptics the subject of the discourses is, generally speaking, the varied and practical topics of religious living—as in the Sermon on the Mount, the qualities of the Christian life and character; or, as in the great Parable Discourse, the nature and growth of the Kingdom of God. In the Fourth Gospel, to an almost exclusive extent, Jesus Himself is made the subject of the discourses, and this self-subject is treated almost wholly from the point of Jesus' transcendental relations to the Godhead. The problem so presented has been sought to be solved, on the one hand by harmonizing the contrasts between the Fourth Gospel and the Synoptics, as both of first-century origin; on the other hand by accepting them as evidence of a second-century origin of the Fourth Gospel. Recently, however, it has come to be recognized that the problem is too complicated to be settled on the basis of the contrasts between the Fourth Gospel and the Synoptics. The Synoptic narrative cannot be accepted as a standard of completeness or accuracy as to Jesus' ministry, or the Synoptic discourses as the only form of address possible on Jesus' part. The problem thus resolves itself into the question, not only as to the extent to which the Fourth Gospel dis-

courses are supposable on the part of Jesus, but also as to how far reliable historical tradition underlies the framework of facts which the Fourth Gospel presents.

In addition to these main problems of the Gospels, there are the following minor ones:

A. **The Problem of the Contents.** Involved in this problem are the following principal points of present-day criticism:

(a) *The Nativity.*—This is given in but two of the four Gospels, Matthew (i. 18-ii) and Luke (i. 5-ii. 39), and is presented by them in narratives differing largely from each other. The one in Luke is the fuller and gives every evidence of having been derived from written Aramaic sources; the one in Matthew gives the impression of having come from oral sources. The chief question of debate is whether these sources rest upon historical fact or are the product of idealizing tradition. Against their acceptance as historical is the difficulty that during the period of the Gospel history there seems to have been no popular, nor even disciple, knowledge of them, the significance of which fact is heightened by the absence of all reference to them in the New Testament epistolary literature. In addition to this, are difficulties in the narratives as they stand—particularly the lack of full harmony in their record of events, as seen in the return of the family to Nazareth: the singular agreement which they bear at points to the national Messianic expectations which were never realized—as seen in the angel announcement that the Child was to ascend the throne of David and reign over the house of Jacob forever; and the poetic elaboration of certain parts—as seen in the songs of Mary and Zacharias. On the other hand, against the interpretation of the narratives as idealizations, there is the difficulty of the necessary assumption of a remarkably early date for the process. Neither Matthew nor Luke was written much, if at all, later than 75 A.D.; and yet at the time of their writing this tradition was not only popularly received, but had come into the elaborated documentary form represented in Luke. Such idealization further must have been of a distinctively Gentile origin. With his high conception of the holiness of the married state, the Jew would not consider supernatural birth necessary for an ideal—in fact, did not so interpret the prophecy of the virgin birth (Isa. vii. 14)—while his severely monotheistic idea of God would render a birth brought about by divine paternity hopelessly foreign to his mind; and yet, on the part of the Gentile, the crude sensuality of supernatural birth in pagan mythologies would make the creation and acceptance of such a tradition regarding Jesus within the Christian Church most difficult of accomplishment; while the origin of the narratives in Oriental myths is critically improbable, in view of the fact that these myths present no analogy to the virgin element in the narratives and that there is absolutely no trace of any process of a pre-Christian development of them which would render possible their final incorporation in the Gospels. Of the problem thus presented there may be no complete solution, though there is nothing in it which renders impossible the acceptance of the essential fact of a miraculous birth. On the contrary, the difficulty of the Gospel and Epistle silence regarding the event, and the difficulty gathering around the presence in the narratives of unfulfilled Jewish ideals,

favor the historical character of the record; since, not only in proportion as the peculiar privacy of the event and the singular suspicion likely to attach to it in the popular mind are appreciated does the lack of publicity given become intelligible, but in proportion as the narratives record a form of announcement which agrees with the stage of Messianic expectations belonging to that beginning time of Gospel history, they show their primitive character, whatever poetic elaborations or harmonistic difficulties they present; while in proportion as the main idea of the supernatural conception which the narratives contain was unnatural to Jewish thought and unlikely of Gentile production or of Oriental derivation, they show an element accounted for only on the assumption of actual fact.

(b) *The Lord's Supper.*—This is recorded by each of the Synoptists, all of whom agree in placing it at the time of, and in connection with, the regular Passover meal. Mark and Matthew, however, agree as against Luke at two points: (1) as to the sequence of the bread and the cup—Mark and Matthew placing the bread first, Luke placing the cup both first and last; and (2) as to the permanence intended in the observance of the meal—Luke making Jesus purpose it as a subsequent memorial of Himself, Matthew and Mark recording no such intention on Jesus' part. At the same time the Synoptists come into definite relation to the narrative of the Passion Week as given by the Fourth Gospel, involving the time of the Supper and its relation to the regular Paschal meal—the Synoptists placing the Supper on the Feast day and making it identical with the Paschal meal, the Fourth Gospel placing the Supper before the Feast day and out of all association with the meal. In addition, account must be taken of the fact that Paul has given us, in 1 Cor. xi. 23–26, a definite statement of the institution of the Supper, which, in proportion as it is earlier than the Gospel narratives could be, takes precedence of the Synoptic records. This Pauline statement agrees with Luke—though only to a very slight degree when the text of the Gospel is relieved of its errors—and thus diverges from Mark and Matthew in its distinct mention of the cup being after the Supper, and of Jesus' purpose that the observance of the meal should be a permanent one with His disciples. In fact, it is quite clear from the character of the account of Luke that, in its statement of the after cup and of Jesus' purpose, it is derived from Paul, who in his statement further diverges from all the Gospels in evidently associating together the Supper and the ordinary religious meal of the Church—the Agape—if he does not actually identify them.

The problem presented is consequently twofold: (1) Was the Supper observed before the regular Passover feast and as a meal distinctly different from it, or at the close of the feast and as a meal definitely associated with it? and (2) Was its observance intended by Jesus to be a permanent one or to be exhausted in the event of that night? As to the first point, in case the dating of the Fourth Gospel is to be taken as correct, that part of the Synoptic narrative which connects the supper with the Passover feast (Mark xiv. 12–16 and parallels, including Luke xxii. 15) must be regarded as a modification of the original tradition, due to

the Church's early identification of the two meals, while the Supper itself must be understood as an ordinary Jewish meal, the bread and wine of which Jesus symbolically refers to Himself. It has been held that in case the dating of the Synoptics is to be accepted, the Fourth Gospel's chronology is to be regarded as distorted by its author, either through ignorance or for partisan reasons, and the Supper itself understood as identified in time and meaning with the regular Passover feast. But it is now recognized that the record of the Synoptics is not consistent with their placing of the meal, but betrays the fact that it could not have occurred on the Feast day, as it must have done if it was identical with the Paschal feast. In either case, however, it is to be noted that all four Gospels agree in placing Jesus' death on Friday, and that the significance recorded by the Synoptists and Paul as attached by Jesus to the bread and wine of the meal is one which refers them to His death as a sacrifice. As to the second point, the fact that Luke's mention of Jesus' purpose of a permanent observance of the Supper is practically derived from Paul confines the authority for this item in the narrative wholly to the Apostle. In regard to the worth of his testimony, it is evident, on the one hand, that the earliness of his account, in comparison with the Gospel records, gives it a relative value beyond theirs. This is confirmed by the almost necessary assumption that, even if the peculiar way in which he introduces his account (verse 23 a) was not intended by him to refer his knowledge of the facts to divine revelation, it was intended to place it on a high plane of authority. On the other hand, the fact that Paul is writing to the disorderly church at Corinth, and has in mind at this particular point in his Epistle their shameful conduct of the Lord's Supper, might lead Paul to read this purpose into the narrative of the event by way of emphasizing to his readers the continual authority of the Supper. It would be manifestly unwarranted, however, to hold that such action on Paul's part disposed of the question, since the portrayal of the Supper by Mark and Matthew as, in the mind of Jesus, a covenant between Himself and His disciples, implies an intended permanence in the observance of the event, which practically involves the command, "This do in remembrance of Me," whether it was actually uttered or not. It would seem, therefore, that whatever difficulties lie in the way of a complete solution of the problem, the following essential facts are clear: that Christ, in a final supper with His disciples, symbolically referred the bread and wine of the meal to His approaching death as a sacrificial act on His part, in their partaking of which symbols they entered into a covenant realization of its benefits and recognition of its obligations.

(c) *The Resurrection.*—While none of the Gospels record the act itself, they all record the fact of the Resurrection, though in narratives which differ widely from one another. (The concluding verses of the last chapter of Mark, xvi. 9–20, are recognized as a later substitute for the ending of the Gospel, and John xxi as a probable supplement to the original Gospel.) The most significant divergence is regarding the scene of the chief appearances of Jesus—Matthew (xxviii. 16–20) and, by implication, Mark (xvi. 7) placing it in Galilee, Luke (xxiv) and John (xx) in Jerusalem. The minor

divergences relate to individualities in the narration of events, involved in which are some notable peculiarities, such as Matthew's reference to the accompanying natural and angelic events (xxviii. 2-4), and the gathering of the eleven at a mountain in Galilee (verses 16-20); Luke's story of the two disciples on the way to Emmaus (xxiv. 13-15), and his account of Jesus' final blessing of the disciple band and His ascension from them at Bethany (verses 50-53); John's record of the curing of Thomas's doubt (xx. 24-29). Further involved in these individualities of narration are some striking difficulties of detail, such as the statement by Luke (xxiv. 9) that the women told their experience at the sepulchre to the eleven and to all the rest, while Mark says that they said nothing to any man (xvi. 8); John's statement that Jesus forbade Mary to touch Him (xx. 17), while Matthew recounts that the women, including Mary, were allowed to clasp His feet (xxviii. 9). Apart from these divergences, however, there manifest themselves the following whole and partial agreements: (1) As to the visit of the women to the sepulchre. All the Synoptists unite in saying that they made their visit early in the morning, finding the tomb empty and returning to the city with the fact impressed upon their minds (Mark xvi. 2-4, 6; Matt. xxviii. 2, 3, 5, 6; Luke xxiv. 4-6 a). John confines his account to the experience of Mary Magdalene, but states also on her part an early-morning visit, implying the finding of an empty tomb, and the announcement of the fact to Peter and John, who themselves go to the sepulchre and confirm the story by their personal observation and then return to their homes (xx. 1-10; cf. Luke xxiv. 12). (2) As to the angelic appearances. All the Synoptists unite in relating a vision of angels at the tomb (Mark and Matthew one angel, Luke two), and a message from the angels, through the women, to the disciples, to the effect that Jesus was risen (Mark xvi. 5, 6; Matt. xxviii. 2, 3, 5, 6; Luke xxiv. 4-6 a), Mark and Matthew adding an announcement that Jesus would meet with His disciples in Galilee (Mark xvi. 7; Matt. xxviii. 7); Luke, merely a reminder of what Jesus had said to His disciples concerning His death and resurrection while He had been with them in Galilee (xxiv. 6-8). (3) As to the appearances of Jesus Himself. (a) Matthew and John unite in relating an appearance to the women after leaving the tomb (Matthew to the group, John to Mary Magdalene). On this occasion a message is given them by Jesus Himself to His disciples (Matthew, that He would precede them into Galilee; John, that He would ascend into heaven) (Matt. xxviii. 10; John xx. 17). (b) Luke and John unite in relating an appearance to certain of His disciples during the evening of this same day, in which Jesus convinced their unbelief by displaying to them the marks of His crucifixion; Luke adding the items of the disciples' fear at the appearance and the material proof given by Jesus of His bodily existence, together with His instruction of them in the Scriptures' reference to Himself and His work; John, the items of the appearance being accomplished in spite of closed doors, Jesus' impartation to them of the Holy Spirit, and His recognition of them as His representatives in the world (Luke xxiv. 36-49; John xx. 18-23). In our study of the Gospel narratives,

however, account must be taken of the definite statement made by Paul in his First Epistle to the Corinthians (xv. 4-8), where he gives a list of six appearances of Jesus—first to Peter, then to the twelve, then to a company of more than 500 disciples, after that to James, then to all the Apostles, adding finally the appearance to himself. This statement, like that regarding the Lord's Supper, has priority over the earliest Gospel account and is placed by the Apostle on a high plane of reliability of source. In view of these facts it is significant that its only divergence from the Gospel accounts is by way of supplementation to what they narrate. From all this, then, it would seem quite possible for Jesus to have appeared to certain individuals among His disciples in Jerusalem and its neighborhood within eight days after His resurrection; later to have appeared to larger numbers of His followers in Galilee; and finally, before His ascension, to have appeared to the apostolic circle in Jerusalem, leading them out to Bethany, where He was parted from them. The only question would be the time taken for the disciples' journey from Jerusalem to Galilee and return, and this is not a serious one. As to the general sequence of events, however, it is quite impossible to construct any narrative which will include all the items of the independent accounts as given us in the four Gospels. It is most likely that the four statements (Matt. xxviii. 1; John xx. 1; Luke xxiv. 4, 10) regarding the visits by the women are merely variants of fragmentary accounts of a single visit early in the morning, for the purpose of completing the burial.

It is quite natural that, when Peter and John were informed as to what had taken place, they should have proceeded at once to the sepulchre in order to verify the facts and, upon arriving at the place, that it should be John who rose to a believing idea as to what might be behind the facts (John xx. 3-10; cf. Luke xxiv. 12). Mary Magdalene may have returned to the sepulchre at the same time as Peter and John, and while there the Master may have appeared to her (John xx. 14-18; cf. Mark xvi. 9)—the vision of angels given in John xx. 11-13 being a confusion of the Synoptic account.

The appearances to the disciples recorded in Luke xxiv. 13 ff., cf. Mark xvi. 12; Luke xxiv. 34, cf. 1 Cor. xv. 5; Luke xxiv. 36 ff.; John xx. 19 ff., cf. Mark xvi. 14, most likely followed in the Jerusalem region; while the appearances in Galilee (as recorded in John xxi. 1-23; Matt. xxviii. 16 ff., cf. 1 Cor. xv. 6 ff.) were probably later.

The appearance to the 500 (1 Cor. xv. 6) was in all likelihood the same as that recorded by Matthew (xxviii. 16 ff.), following the meeting at the lake referred to by John (xxi. 1-23). The appearance to James (1 Cor. xv. 7) may naturally have been the last before the ascension, which latter event is referred to by Paul as the appearance to "all the apostles," at which time the commission was most fittingly given—Matthew inaccurately connecting it with the appearance to the disciples in Galilee (xxviii. 18-20), and Luke compressing it into connection with the appearance to the eleven in Jerusalem in his desire to prepare the closing of the Gospel narrative for the beginning of that of his Second Book.

As a general result, the problem presents itself, not as one of mutually exclusive records,

since, admitting all the minor contradictions, the agreement among the narratives as to the essential facts is clear. The problem reduces itself in reality to the question whether the source of these narratives is more likely to have been the actual fact of the resurrection, evidenced to the disciples, or a self-persuasion of it on their part, through a desire to believe it to have occurred, though it had not. The decision between these alternatives will be determined by the inference which must inevitably be drawn from the facts (1) that the disciples did not reach their belief by any slow process of reasoning, but by an almost immediate conviction of the event, in spite of their deep despondency over Calvary; and (2) that it has been on the proclamation of this event, as the basal ground of its faith in Jesus, that Christianity has reached its stupendous results in the world.

**B. The Problem of the Chronology.** This concerns itself chiefly with the question as to the length of Jesus' ministry; and this question turns largely upon the character of the feast mentioned in John v. 1. If this is held to be a Passover, the duration of His active work is extended to at least three years; if it is not so held, the limit is reduced to perhaps two years. For full discussion of this and minor points, see *NEW TESTAMENT CHRONOLOGY*. See also the articles on the individual Gospels.

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**GOSPEL.** In the liturgical sense, the short selection from the Gospels which is read or sung in the mass and in the Anglican communion service between the epistle and the creed. It formed a regular part of the service as early as the second century. For 200 years the reading was continuous, taken up each day where the previous one had stopped; but when the calendar was fully developed under Pope Damasus the selections were chosen to correspond with it. The liturgical gospels were not originally included in the same book with the rest of the service, which allowed special ceremonial veneration to be paid to the book containing them. Thus, in the fifth century it was brought in solemn procession and laid upon the altar at

the beginning of the service; a relic of this practice is the present custom of having the deacon deposit it for a while upon the altar immediately before singing the gospel. The bearing of lights in connection with it was known to St. Jerome and signifies the illumination of the world by the gospel message. The reading is prefaced by the response *Gloria tibi, Domine* (Glory be to thee, O Lord!), and followed by *Laus tibi, Christe* (Praise be to thee, O Christ!), after which the book is kissed by the celebrant. All present have always stood during the reading with uncovered heads, even kings laying aside their crowns. The recitation of the "last gospel" (commonly the first 14 verses of John, unless commemoration is made of a superseded office by the use of its gospel) is of later introduction. In the thirteenth century the priest recited it on the way to the sacristy, as the bishop does to-day on the way from the altar to his throne. Pius V in his revised missal gave it its present place. See MASS; EPISTLE.

**GOSPELER.** A name applied to the minister in the Church of England who reads the gospel in the communion service, analogous to the deacon in the mass. (See EPISTOLER.) It was also used as a nickname for Wiclif and his followers when they devoted themselves to the circulation of the Scriptures in the vernacular.

**GOSPORT.** A fortified seaport and market town in Hampshire, England, 81 miles southwest of London, on Portsmouth harbor (the English Channel), directly opposite Portsmouth, with which it is connected by a floating bridge (Map: England, E 6). It is the chief manufacturing seat and depot of stores for the equipment of the British navy. The inhabitants are mostly engaged in government establishments, which comprise powder magazines, fusee and rocket laboratories, and the Royal Clarence Victualing Yard, with its various important departments. Among the industries are the manufacturing of anchors and chain cables, yacht building, and sailmaking. The town is inclosed within ramparts with an outer circle of forts, which merge in the continuous barrier that surrounds Portsea and Portsmouth. On the southeast is Haslar Hospital, the celebrated national institution for disabled sailors, accommodating 2000 patients. Bishop Henry de Blois is said to have bestowed the name of God's port—hence Gosport—when he found safety here during a storm in 1158. The large suburban district of Alverstoke is included in the census of Gosport. Pop., 1901, 28,900; 1911, 33,300.

**GOSS, CHARLES FREDERIC** (1852– ). An American Presbyterian clergyman and writer, born at Meridian, N. Y. He graduated from Hamilton College in 1873 and from Auburn Theological Seminary in 1876. Ordained in 1876, he held various pastorates until 1885, when he was called to the Moody Church in Chicago. In 1892–94 he was assistant pastor of the Madison Avenue Church, New York, and after 1894 pastor of the Avondale Presbyterian Church, Cincinnati, Ohio. He is author of *The Optimist* (1897; 4th ed., rev., 1905); *The Philoplist* (1898); *Hits and Misses* (1899); *The Redemption of David Corson* (1900), his best-known book; *The Loom of Life* (1902); *Little Saint Sunshine* (1902); *Just a Minute* (1904); *Husband, Wife, and Home* (1905); *That Other Hand upon the Helm* (1910); *Cincinnati, the Queen City, 1788–1912* (4 vols., 1912).

**GOSS, WILLIAM FREEMAN MYRICK** (1859–

). An American mechanical engineer, born at Barnstable, Mass. He studied at Massachusetts Institute of Technology in 1877–79; organized the department of practical mechanics at Purdue University, where he was dean of the School of Engineering and director of the engineering laboratory from 1890 to 1907; and thereafter was dean of the College of Engineering at the University of Illinois. In 1913 he was engineer for the committee of investigation of the smoke nuisance in Chicago. He also served as president of the American Society of Mechanical Engineers in 1913. Besides various papers and reports on locomotive service, he is author of *Bench Work in Wood* (1887; rev. ed., 1905); *Locomotive Sparks* (1902); *Locomotive Performance* (1907); *Superheated Steam in Locomotive Service* (1910); *Tests of a Jacobs-Shupert Boiler* (1912).

**GOSSART, GÖS'SÄRT, JAN.** See MABUSE, JAN.

**GOS/SAMER** (Mf. *gossomer, goesomer*, goose summer, from *gos*, goose + *somer*, summer; so called on account of the downy appearance and the time of coming). A light filamentous substance, which often fills the atmosphere to a remarkable degree during fine weather in autumn, or is spread over the ground, stretching from leaf to leaf and from plant to plant, loaded with dewdrops, which glisten and sparkle in the sunshine. It is produced by small spiders of many species and is said to be produced by young and not by mature spiders—a circumstance which, if placed beyond doubt, would help to account for its appearance at a particular season of the year. The threads of gossamer are so delicate that a single one cannot be seen unless the sun shines on it; but being driven about by the wind, they are often beaten together into thicker threads and flakes. They are often to be felt on the face when they are scarcely visible. The spiders which produce these threads shoot them out from their spinnerets—a viscid fluid being ejected with great force, which becomes a thread; sometimes several such threads are produced at once in a radiating form, and these, being caught by the ascending current of heated air, are borne up, and the spider along with them. See SPIDER.

**GOSSE, GÖS, EDMUND WILLIAM** (1849– ). An English poet, critic, and biographer. He was born in London, the son of Philip Henry Gosse. Though he did not have a university education, he received, in recognition of his services to letters, the degree M.A. (1885) from Cambridge and the degree LL.D. (1899) from St. Andrews. In 1867 he was appointed assistant librarian in the British Museum; in 1875, translator to the Board of Trade; in 1884, Clark lecturer in English literature at Trinity College, Cambridge; and in 1904, Librarian to the House of Lords. In 1884 he visited the United States, lecturing at Harvard, Yale, Johns Hopkins, and other colleges. His chief works are: *Madrigals, Songs, and Sonnets* (1870); *On Viol and Flute* (1873); *Northern Studies* (1879); *Thomas Gray* (1882); *Seventeenth Century Studies* (1883); *Congreve* (1888); *History of Eighteenth Century Literature* (1889); *The Secret of Narcisse* (1892); *In Russet and Silver* (1894); *The Jacobean Poets* (1894); *Critical Kit-Kats* (1896); *Short History of English Literature* (1897); *Life and Letters of Dr. John Donne* (1899); *An Illustrated History of English Literature*, with Garnett (1902); *Jeremy Taylor* (1904); *French Profiles* (1905);

*Coventry Patmore* (1905); *Sir Thomas Browne* (1905); *Father and Son* (1907), crowned by the French Academy in 1913, an autobiographic work; *Henrik Ibsen* (1908); *Portraits and Sketches* (1912); *Two Visits to Denmark, 1872, 1874* (1912); *Collected Essays* (5 vols., 1913).

**GOSSE, NICOLAS LOUIS FRANÇOIS** (1787-1878). A French historical painter, born in Paris, where he studied at the Ecole des Beaux-Arts and under Vincent and became a skilled representative of the classic academic style. His principal works include: "Napoleon I and Queen Louise at Tilsit," "Meeting of Napoleon and Alexander of Russia at Erfurt," and "Louis Philippe Declining the Crown of Belgium Offered to his Son," all in the Historical Museum at Versailles; and "Entry of the Duke of Angoulême into Madrid," a wall painting in the Hôtel de Ville, Paris.

**GOSSE, PHILIP HENRY** (1810-88). An English naturalist, born at Worcester, England. From 1827 to 1835 he lived in Newfoundland as a merchant, from 1835 to 1838 in Canada as a farmer, and from 1838 to 1839 in Alabama as a teacher. In 1844 he visited Jamaica to study the birds there. He was an accurate observer of animal life and a voluminous and most agreeable writer. In 1856 he was made F.R.S. Gosse did a great work in advancing and popularizing marine zoology, and the influence he exerted was widespread and lasting. Among his publications are: *The Canadian Naturalist* (1840); *Birds of Jamaica* (1851); *Natural History* (1848-51); *A Naturalist's Rambles on the Devonshire Coast* (1853); *The Aquarium* (1854); *Marine Zoology* (1856); *Evenings with the Microscope* (1859); *Letters from Alabama* (1859); *Land and Sea* (1865); *Life in its Lower Forms* (1875); *A Year at the Shore* (1877).

**GOSSEC, gô'sék', FRANÇOIS-JOSEPH** (1734-1829). A French composer, born at Vergnies in Hainaut. He was a choir boy in the Antwerp Cathedral and then went to Paris, where, through the influence of Rameau, he was employed by a rich amateur, La Popelinière, to direct his private orchestra. Gossec has been called "the father of the symphony in France." He found all instrumental music neglected and made it his ambition to revivify it. His first symphonies were published in 1754, five years before Haydn wrote his. While orchestra conductor to the Prince of Conti, he wrote several operas. To him belongs the honor of having started the Ecole Royale de Chant (1784), which was the prototype of the Conservatory, and when that institution itself was founded (1795), he was one of the three inspectors, the others being Méhul and Cherubini. During the Revolution he was the conductor of the band of the Garde Nationale and composed a good deal of national music for fêtes. A critic sums up Gossec as "not one of those geniuses who defy time," and he had the misfortune to see his ideas improved upon by some of his contemporaries; but his influence on the development of instrumental music in France can hardly be overestimated. His works include: *Le faucon* (1764); *Les pêcheurs* (1766); *Alexis et Daphné* (1775); *Philémon et Baucis* (1775); *La fête du village* (1778); *Thésée* (1782); *Rosine* (1786); *Chant du 14 Juillet, Hymne à l'humanité; Hymne à l'Etre suprême; Chœurs et chants pour l'apothéose de Voltaire et de*

*Rousseau*; some oratorios and a 'good deal of instrumental music. Consult F. Hellouin, *Gossec et la musique française à la fin du dix-huitième siècle* (Paris, 1903).

**GOSSELIN, gôs'lân', AUGUSTE HONORÉ** (1843-). A Canadian historian and biographer. Born at St. Charles de Bellechasse, Province of Quebec, educated at the Quebec Seminary and Laval University, and ordained a Roman Catholic priest in 1866, he was secretary to the Archbishop of Quebec for two years, vicar at the Quebec Basilica in 1868-69, pastor of Ste. Jeanne de Neuville, Pont Rouge, in 1869-86, and pastor of St. Féréol until 1893, when he turned to literary work. In 1892 he was elected a fellow of the Royal Society of Canada and later a corresponding member of the Society of Antiquities of Normandy. In 1907 he was appointed a member of the Canadian Historical Manuscript Commission. He published: *La vie de Mgr. Laval, premier évêque de Québec et apôtre du Canada* (2 vols., 1890); *Les Normands au Canada* (3 vols., 1892-94); *Observations à propos du P. le Jeune et de M. de Queylus* (1896); *La vie de Henri de Bernières* (1897); *Un bon patriote d'autrefois, le Dr. Labrie* (1898); *Mgr. de Saint Valier et son temps* (1900); *Jean Nicolet et le Canada de son temps* (1905); *L'Abbé Holmes et l'instruction publique* (1908); *Le vrai monument de Champlain* (1909); *Au pays de Mgr. de Laval* (1910); *L'Eglise du Canada depuis monseigneur de Laval jusqu'à la conquête* (1911).

**GOSSELIN, PASCAL FRANÇOIS JOSEPH** (1751-1830). A French archæologist, born at Lille, France. After acting as a deputy to the National Assembly (1789), he became a member of the central administration of commerce (1791), and was employed in making maps for the War Department (1794). He was employed by Napoleon to assist in the translation of Strabo, was one of the chief editors of the *Journal des Savants* after 1816, and published, among other works, *Géographie des Grecs analysée* (1790) and *Recherches sur la géographie systématique et positive des anciens* (1798-1813).

**GOSSLER, gôs'lér, GUSTAV VON** (1838-1902). A Prussian statesman, born at Naumburg. He studied law at Berlin, Heidelberg, and Königsberg, and, after having held a number of government posts, was an assistant in the Ministry of the Interior from 1874 to 1878, and in 1879 was appointed Undersecretary of State in the Ministry of Ecclesiastical Affairs and Public Instruction. In 1881 he succeeded Puttkamer in the ministry. The troubles attending the Kulturkampf were still active, but he ended them by a practical scheme of informal concession to the Roman church. Thus, he did away with several provisions of the so-called "May Laws," such, e.g., as the examination of the clergy and appointment of priests by the state. Other measures of conciliation were also devised by him, sometimes net without the opposition of the Prussian government. He very vigorously opposed the Polish nationalistic movement in Posen, and in 1887 struck a decisive blow by abolishing instruction in the Polish language in the public schools, and thus did much to bring about the acute Polish situation which exists to-day. In 1890 he formulated a school law which gave offense to the Poles, and of whose immediate passage there was little hope, since the government at that time required Polish assistance in the Reichstag in support of its

commercial projects. He therefore resigned in 1891 and soon afterward was appointed Lord Lieutenant of West Prussia. Consult his *Ansprachen und Reden* (Berlin, 1890).

**GOSSNER**, gōs'nēr, JOHANNES EVANGELISTA (1773-1858). Founder of the Gossner Foreign Missionary Society. He was born at Hausen, near Augsburg, Dec. 14, 1773, educated at Dillingen and Ingolstadt, and from 1796 to 1828 served in the ministry of the Roman Catholic church. During 1820-24 he was preacher in St. Petersburg. As early as 1802 he was suspected of leanings towards Protestantism, and in 1826 he openly joined the Evangelical church. From 1829 till 1846 he preached in Berlin and labored zealously for missions, education, and philanthropic undertakings. He became a director of the Berlin Missionary Society when it was founded in 1831, but left it in 1836 because he wished missionaries to have greater liberty of action. Assisted by voluntary contribution, he continued to send forth missionaries, and in 1842 his missionary society was formally organized. It still exists, and labors chiefly in the East Indies. Gossner died March 30, 1858. Among other works he published: *Geist des Lebens und der Lehre Jesu* (1823); *Die Heiligen Schriften des Neuen Testaments mit Erklärungen und Betrachtungen* (new ed., 1888-94); *Goldkörner* (6th ed., Berlin, 1893). Consult his life by Dalton (Berlin, 1878).

**GOS'SON**, STEPHEN (1554-1624). An English author, born in Kent. Entering Corpus Christi College, Oxford, he was graduated B.A. in 1576 and wrote several plays, of which none are extant. Later he attacked the stage violently and took orders. In his *Schoole of Abuse* (1579; reprinted by E. A. Arber, 1868) he began a lively controversy about the stage, which led to many pamphlets and ultimately to Sidney's *Apologie for Poetrie* (1595).

**GOSSYPYUM**. See COTTON.

**GOSZCZYŃSKI**, gōsh-chun'skē, SEWERYN (1803-76). A Polish poet, born in the Government of Kiev, Russia. He was educated at Warsaw and was one of the foremost leaders of the revolution of 1830. He was one of the band of fugitives who subsequently assembled in Paris, and they exercised a very powerful influence upon him. In 1872 he returned to Lemberg, where he died. His works are lyrical in character, and many of them are devoted to a description of life in the Carpathians and in the Ukraine. Most of them are characterized by a vein of sadness due probably to the political conditions which have weighed so heavily upon the patriotic poets and authors of Poland. During the latter part of his life he fell under the influence of the mystic Towianski (q.v.). His principal poetic productions include: *Zamek Kaniowski* (The Kaniow Castle, a gruesome epic betraying Byron's influence; trans. into German and French); *Król Zameczyska* (The King of the Ruined Castle, 1842); *Oda*; *Powieść z czasów Bolesława Chrobrego* (1852); *Posłanie do Polski* (Message to the Poles, 1869). He also prepared an excellent translation of Ossian. The latest edition of his *Works* is that of Lemberg (2 vols., 1904).

**GOT**, gō, FRANÇOIS EDMOND (1822-1901). An actor of the Comédie Française, where he made his appearance in 1844. He was born at Lignerolles (Orne) and educated at the Lycée Charlemagne. After a short time spent as a government clerk he entered the Conservatoire in 1841,

where in the two following years he carried off successively the second and first prizes. He made his début at the Comédie Française in 1844 as Alexis in *Les héritiers* and Mascarille in *Les précieuses ridicules*. He speedily rose to the highest rank as a comic actor, and was elected a member of the company six years later. His subsequent career was spent chiefly at the "House of Molière," but in 1866 by special arrangement he played in Emile Augier's *Contagion* at the Odéon and afterward "starred" in this piece in various provincial cities. One of his most popular creations was Giboyer in *Les effrontés* and *Le fils de Giboyer*, a part to which he devoted himself for two years. M. Got was the author of the libretto of *François Villon*, which was rendered at the Opéra in 1857, and of *L'Esclave* (1874). His golden jubilee at the Théâtre Français was celebrated in 1894, and he made his farewell appearance in 1895. He died in Passy.

**GÖTA-ELF**, yō'tā-ēlv' (elf, Dano-Norwegian *elv*, river). The outlet of Lake Venern (q.v.) in Sweden, forming, with its upper course, the Klar-Elf, the largest river system of the Scandinavian peninsula. The Klar-Elf rises among the Kjölen Mountains a short distance from the Norwegian boundary, and on the boundary between Svearike and Norrland, and flows south-east as a violent mountain torrent, first through a part of Norway, where it widens into the Fämund-Elf, and then through the Swedish Län of Vermland, where it empties into Lake Venern at Karlstad. Leaving Lake Venern at its southwest corner, the Göta-Elf proper flows in a nearly southerly direction and empties by two arms into the Cattegat at the city of Göteborg, situated on the south arm. The length of the Göta-Elf is 68 miles, but the whole length of the river, including the Klar-Elf, is 440 miles. The river forms a number of falls or rapids, of which the famous Trollhättan (Witch's Cap) in the Göta-Elf proper, a few miles below Venern, is the largest and is one of the most picturesque rapids in the world. Navigation has been made possible past the Trollhättan by means of a canal, which through Lake Venern connects with the Göta Canal, constructed in 1810-32 at a cost of over 14,000,000 kroner (about \$4,000,000) and which opens up a continuous waterway by way of Lake Vettern from the Cattegat to the Baltic Sea through the heart of Sweden.

**GOTAMA**, gō'tā-mā. An early Hindu philosopher and logician. He is the reputed author of the *Nyāya-Sūtras*, or aphorisms of logic, which form the basis of the Nyaya system of philosophy (q.v.). As an appellative, Gotama is a very old name in India; one of the Vedic seers was called Gotama and bore the patronymic Rahugana. From Gotama descended the family of the Gautamas. Buddha also was known as Gautama Buddha (q.v.), or in the Pali form as Gotama Buddha.

**GÖTARIKE**, yē'tā-rē'ke, or **GOTHLAND** (Swed., Kingdom of the Goths) (Map: Sweden, E 8). One of the three historical divisions of Sweden, occupying the southern part of the country and divided into 12 läns.

**GOTCH**, FRANCIS (1853-1913). An English physiologist, born in Liverpool and educated at Cambridge. He was appointed demonstrator in physiology at Oxford University in 1883, accepted the chair of physiology at Liverpool in



1891, and returned in 1895 to Oxford, where he held the Waynflete professorship until his death. His researches concerned particularly the excitable tissues of the muscles and nerves. He was elected a fellow of the Royal Society in 1892. He published *Two Oxford Physiologists: Richard Lower, 1631 to 1691, John Mayow, 1643 to 1679* (1908).

**GÖTEBORG**, yē'te-bōr'y', **GOTH'ENBURG**, or **GOT'TENBURG**. Capital of the Län of Göteborg and Bohus, and, next to Stockholm, the most important city of Sweden, situated on the river Göta, 4 miles from its mouth (Map: Sweden, D 8). The town is semicircular in form and lies in a plain surrounded by hills. The newer sections are built on the hills; the lower portion along the river has broad streets, partly formed by canals and lined with trees. In the centre of the town are the Gustav Adolfs Torg, or market place (containing statues of Gustavus Adolphus, Oscar I, and Odin), the exchange, and the town hall. Other noteworthy buildings are the cathedral, the Governor's palace, and the arsenal. The educational institutions comprise a university supported from private funds, with 2051 students, mostly auditors, in 1913; a Gymnasium; technical, commercial, and nautical schools; a municipal library of 125,000 volumes; a museum with fine archaeological, zoological, and industrial collections; and a scientific society, founded in 1778. The water supply is good; the streets are lighted by gas and electricity. Street railways and omnibuses traverse the town.

Cotton spinning, saw milling, shipbuilding, iron and steel milling, are among the manufacturing industries. Other important products are sugar, porter, paper, sailcloth, and leather; the town stands preëminent in Sweden on account of its commerce. Its harbor which has 3 miles of quays approachable by vessels of 20-foot draft, is rarely blocked by ice and affords a shelter for a large number of vessels from all parts of the world. The largest exports are pig and wrought iron, steel, zinc, manganese, lumber, matches, oats, fish, and pork. Among the imports are sugar, coffee, grain, cotton and cotton goods, and coal. Göteborg receives about one-fourth of the total foreign commerce of Sweden. The United States is represented by a consul. Pop., 1840, 26,084; 1900, 130,619; 1912, 173,875. Göteborg was founded on its present site in 1619 by Gustavus Adolphus and is world-famous for its plan of municipal licensing known as the Gothenburg System (q.v.).

**GOTHA**, gō'tā. The capital of the Duchy of Gotha and, alternately with Coburg, the residence of the dukes of Saxe-Coburg-Gotha. It is situated on the Leina Canal, 17 miles by rail southwest of Erfurt (Map: Germany, D 3). Gotha is a well-built, pleasant city, near the north edge of the Thuringian Forest. It is composed of the old inner town and four modern suburbs separated from it by promenades. The finest building is the ducal palace of *Friedenstein*, situated on an eminence south of the old town. It is an extensive building, with two massive towers, erected in 1643 by Ernest the Pious, and occupies the site of the old fortress of *Grimmenstein*. It is surrounded by promenades and a park and contains a library of about 200,000 volumes, 1900 incunabula, as well as 7000 manuscripts, including many in Arabic, and one of the best collections of coins in Germany. The public park is worthy of note.

The well-known museum was constructed in an ornate Renaissance style in 1864-77. It contains an extensive collection of ancient pottery, gold, ornaments, weapons, embroideries; an ethnographical collection; a splendid gallery of paintings, rich in old masters; a collection of sculptures, engravings, and casts; a natural-history cabinet; and a variety of miscellaneous treasures. Other noteworthy buildings are the fine sixteenth-century Renaissance Rathaus, the Augustinian Church with a large altarpiece, the theatre, and the Friedrichsthal Palace (now occupied by the government offices), the Masonic lodge, and the post office. The town is lighted by electricity and has an electric street railway. Educational and benevolent institutions are numerous, including art and medical schools. There are also many active unions and associations, scientific, historical, etc. It is noted for the number and activity of its insurance societies. The city is an important centre in the publishing and art trade of Germany. The famous *Almanach de Gotha* and *Petermann's Mitteilungen* are published here, being issued by the firm of Justus Perthes, the foremost geographical establishment in Germany. Industrially and commercially Gotha is one of the most important cities of Thuringia. The chief products are porcelain ware, meat, footwear, tobacco, machinery, soap, sugar, woollens, stoves, and brick. There are also large railway repair shops and numerous engraving and printing establishments. Pop., 1890, 28,134; 1900, 34,651; 1910, 39,553, composed almost exclusively of Protestants.

Gotha probably was a village at the time of Charlemagne. It is first mentioned as a town at the beginning of the twelfth century, when it belonged to the landgraves of Thuringia. In 1440 it passed to the electors of Saxony. In the partition of the Saxon dominions in 1485 it became part of the possessions of the Ernestine line, and since 1640 has been the capital of the Duchy of Gotha. See **SAXE-COBURG-GOTHA**.

**GOTHA**, **ALMANACH DE**. A universal political register, printed in German from 1764 to 1804, in French from 1805 to 1871, and since in both languages. See **ALMANAC**.

**GOTHA**, **DUCHY OF**. See **SAXE-COBURG-GOTHA**.

**GOTHAM**, gō'tam or gōth'am or gō'tham. A parish in Nottinghamshire, England, the name of which is suggestive of simple or foolish people. Tradition states that King John proposed making a progress through the town with the intention of purchasing a castle, but the people (the traditional "Wise Men of Gotham"), averse to the expense of maintaining royalty, turned him away by engaging in idiotic pursuits. Gotham, however, is only one of the many European localities to which a similar tradition is applied. Irving in his *Salmagundi* applied the name "Gothamite" to the inhabitants of New York. Consult Cunningham, *Amusing Prose Chap-Book* (Glasgow, 1888).

**GOTHAM ELECTION**, A. A farce by Mrs. Centlivre, published in 1715, but never acted.

**GOTHAMITE**, gō'tham-it or gōth'am-it. A New Yorker; a designation first applied by Washington Irving in *Salmagundi* in 1807.

**GOTHENBURG**, gō'ten-burk. See **GÖTEBORG**.

**GOTHENBURG SYSTEM**. The system of regulating the liquor traffic at Gothenburg, or Göteborg, in Sweden, put in operation in 1866. In 1864 a committee on pauperism proposed as



a remedy that the sale of the national drink (brandy) should, under the Law of 1855, be bonded over to a company to carry on the trade for the benefit of the working classes. The general features of the system are as follows: The company is granted a monopoly for which it pays a tax; the shareholders, who are usually prominent citizens, cannot receive a dividend beyond 6 per cent (5 per cent in Norway); the additional profits of the company are shared between the town, the agricultural society of the province, and the general government (in Norway by educational and charitable institutions); the well-kept bars are placed in the hands of managers who receive a salary, who maintain eating houses with cheap, well-cooked food, and who can sell coffee, mineral waters, and cigars for their own profit. The policy of the company has been that of strict control, a reduction of the number of drinking places, and the raising of the price of brandy. Some of the results, it has been claimed, are the diminishing of the temptation to drink, the divorce of liquor from politics, the sale of pure spirits, and better rules as to minors and hours. The system with variations has been widely adopted in Sweden and Norway and also in Finland. While the system has been the subject of numerous encomiums, from both native and foreign observers, there have not been wanting students who have pointed out abuses connected with it. Since profits from the bars are in many cases a significant form of public revenue, the municipal officers have had an inducement to encourage drinking. Further, other spirituous liquors, not controlled by the system, have gained in popularity; and sale in bulk, which is likewise free from control, has gained relatively to trade at the bar.

A modified form of the Gothenburg system was adopted by South Carolina in 1892 under the name of the dispensary system. The sale of all forms of intoxicating liquors was monopolized by the State. The system gave rise to much popular dissatisfaction; charges of corruption were freely made, and in 1907 the system was abandoned. Consult: *Report of Massachusetts Committee on Gothenburg System* (1893); Rowntree and Sherwell, *Gothenburg Experiments and Public-House Trusts* (London, 1901); Thompson, "The Gothenburg Method," in *Transactions of Wisconsin Academy of Science, Arts, and Letters*, vol. xiii (Madison, 1901); Pratt, *Licensing and Temperance in Sweden, Norway, and Denmark* (London, 1907); Gordon, *The Breakdown of the Gothenburg System* (New York, 1911). See TEMPERANCE.

**GOTHIC ARCHITECTURE.** Common usage has, ever since the Renaissance, employed this name to designate collectively and without discrimination the styles which were developed by the ecclesiastical builders of the Middle Ages in western Europe between 1150 and 1500, of which the most obvious common characteristics were the pointed arch, the traceried window, the flying buttress, spires and pinnacles, and internally the ribbed groined vault. The name "Gothic" is an obvious misnomer, for the Goths as a nation had disappeared long before the beginnings of this architecture, which was a logical outgrowth from the Romanesque of the twelfth century. (See ARCHITECTURE.) The Romanesque builders of France had evolved, especially in their monastic architecture, a type of cruciform church with three (rarely five)

aisles, having stone-vaulted side aisles flanking a loftier central aisle lighted by a clearstory (q.v.), and usually vaulted in stone, though sometimes the ceiling was of wood.

During the first half of the twelfth century groined vaulting upon a framework of ribs had come into quite general use for the vaulting of all three aisles, allowing the clearstory windows to be carried much higher than was possible with a barrel vault, and furthermore concentrating the loads and thrusts of the heavy vaults at distinct isolated points instead of distributing them equally along the entire length of the structure. To resist these separate concentrated strains rudimentary forms of buttress (q.v.) and flying buttress had been devised.

These structural features the Gothic architects made the basis of a remarkable system of architecture in which structural requirements were met by practical devices frankly expressed in the design and made to contribute to the general decorative effect, with a constant progressive striving towards economy of material and loftiness and lightness of interior design. The decorative details were derived from nature, and sculpture, painting, and stained glass made to serve religious-didactic purposes, always subservient to the architectural ensemble. This development, which produced in time the most perfectly logical and structurally expressive of all architectural styles, was greatly stimulated by the rise of the episcopal power as against the monastic orders in France and was thus in an especial sense a cathedral-building movement, though by no means confined to cathedral buildings. The forms and principles it developed were applied to all sorts of buildings. The style spread from France to England, later to Germany and Spain and the Low Countries, and in greatly modified fashion to Italy. It made no impression on the Byzantine East. In the nineteenth century a persistent effort was made in England and to some extent in Germany and France to revive Gothic architecture modified to meet modern requirements (see VICTORIAN GOTHIC); it was only partially successful, though it has exerted some influence on modern design. Concurrently with the development of this remarkable ecclesiastical and civic architecture, the feudal lords and military chieftains of Europe were developing on quite different lines the military or feudal architecture (q.v.) of their castles, city walls, and fortresses. But though totally different in form from the Gothic church architecture, it displays the same logical directness of design, the same frankness of structural expression, whether in gate, tower, wall, or donjon. See FEUDAL ARCHITECTURE; CASTLE; DONJON.

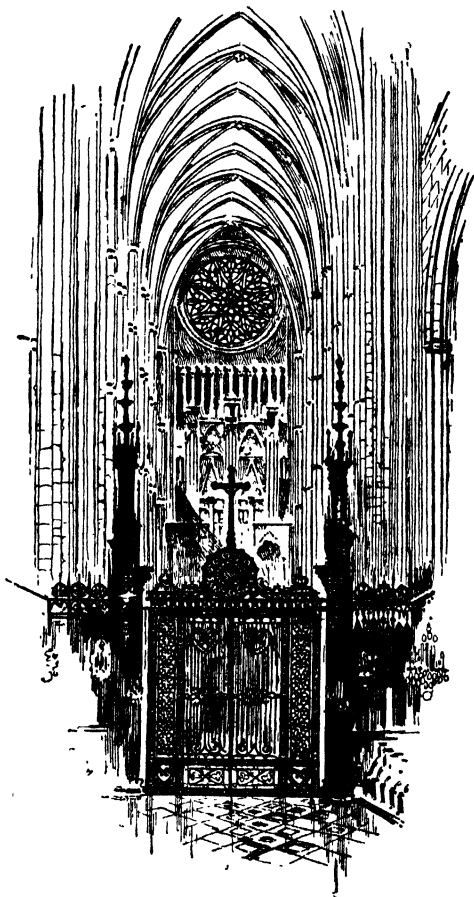
**France.** The transition from the heavy, round-arched Romanesque style, with its massive walls, small windows, and moderate height, to the Gothic style, with its light and lofty proportions, great traceried windows of stained glass, its pointed arches, slender clustered piers, ribbed groined vaults, flying buttresses, pinnacles, and wealth of floral carving and of sculpture, appears to have first begun, and can best be traced, in the region about Paris, the ancient "Ile-de-France," or Royal Domain, where the free communes were most numerous, and where the royal power seconded the rising of the bishops against the arrogance of the abbots and monastic orders. The germs of the transition are discoverable at Morienval, Saint-Germer-

de-Fly, Saint-Etienne at Beauvais, and other churches erected previous to 1140. The pointed arch, employed both because it exerts less thrust than the round and because it can be made to reach any desired height with a given span, began to be applied to the vault ribs (see VAULTING) in these churches, and perhaps earlier in the porch of Vézelay Abbey in Burgundy. The original construction of the abbey of Saint-Denis (1140) embodied systematically many of the Gothic features. The cathedrals of Senlis, Noyon, and Laon, begun somewhat later, showed further progress; but it was the great cathedral of Notre Dame (q.v.) at Paris, begun in 1163, that first displayed the results of these developments in their completeness. The cathedral of Chartres, begun in its present form about 1190; of Rheims, dating from 1208; of Amiens, the greatest of all French cathedrals, begun in 1220; of Rouen, Bourges, Troyes, Tours, Le Mans (choir), and Soissons, represent the style in its maturity, attained by the middle of the thirteenth century, when the effort after lightness and loftiness reached its culmination. While the vault of Notre Dame is but 108 feet high, that of Amiens is 142 feet high. At Beauvais, begun about 1247, this effort overreached itself; the vault, 156 feet high, collapsed in 1275, and though the choir and transepts were rebuilt, the nave was never added.

The style spread rapidly from the Royal Domain through Normandy, Champagne, Picardy, and Burgundy, but made little impression on Brittany and southern France until the latter part of the fourteenth century, by which time the cathedral-building movement had nearly ceased. This decline was partly due to war and political confusion, partly to the fact that by that date the strong and rich dioceses were already provided with cathedrals. The grandest of the later cathedrals is that of Albi, dating from about 1300; it is unique in the vast space of its one-aisled nave, measuring 65 feet in width and flanked by side chapels; it has no transepts. But while the building of cathedrals declined and then ceased, that of churches and chapels continued, in a new and increasingly ornate style of design, in which structural expression was subordinated to decorative elaboration. At Rouen the church of Saint-Ouen marks the early stages, that of Saint-Maclou the culmination, of this later phase of the Gothic style; while the long-unfinished façade of the cathedral displays it in its utmost extravagance of minute elaboration. This last development was most successful in minor works like choir screens, pulpits, and tombs. It is thus possible to trace in French Gothic work three well-marked stages. The first, or *Early French*, extending from 1160 to about 1220, is the period of development, marked by a certain severity and high purity of detail and great simplicity of tracery, as in Notre Dame at Paris. The second is that of culmination, commonly called the *Rayonnant* on account of its superb radiating or rose windows; it is characterized by elaborate geometric tracery and richer moldings and carving than the first period (Amiens; Sainte Chapelle at Paris; transept fronts of Notre Dame, Paris), and extends to about the middle of the fourteenth century. The last period, from 1350 or 1375 to 1525, is called the *Flamboyant*, from the flamelike patterns of its tracery; its principal characteristics have already been described. To those already men-

tioned should however be added the general omission of capitals on the piers, a certain wire-drawn thinness of moldings, and the carrying up of ogee dripstones over the exterior arches, terminating in exaggerated finials. Notable examples, besides those already mentioned, are the churches of Saint-Jacques at Dieppe, Saint-Wolfren at Abbeville, the front of Notre Dame de l'Epine at Châlons, the Saint-Esprit Chapel at Rue, the church at Louviers, and the exquisite north spire of Chartres Cathedral (1525).

The perfected type of Gothic architecture, best illustrated by the cathedral of Amiens, displays, in plan, an enlarged choir with aisle



AMIENS CATHEDRAL — INTERIOR.

and radiating chapels, no crypt, a short transept, three or five aisles, and sometimes a continuous line of aisle chapels; in front elevation, a western façade with two flanking towers, three prominent portals richly adorned with carving and figure sculpture, and a wheel or rose window in the centre above them. In side elevation but little wall surface appears except a row of pinnacled buttresses, the space between them being occupied by windows filled with tracery and stained glass. The interior was divided into bays by strongly marked vertical lines of support from the piers upward, presenting as if in three stories the piers and arches opening into the side aisles, the triforium passage above them, and the great traceried clearstory windows reaching

up to the groined vaulting overhead. In the rich decoration the characteristic feature is the abandonment of classic and, indeed, of all traditional design, and the direct recourse to natural fauna and flora for models, which were of the greatest variety and truth. No period has so beautifully reproduced foliage and flowers in stone. But though there was a dominant type, there were wide differences; e.g., the façade towers terminate in spires at Chartres Cathedral, while at Notre Dame, Laon, Amiens, and elsewhere, they have square terminations. Other differences, though not fundamental, mark



AMIENS CATHEDRAL.

special schools of Gothic in Burgundy (Notre Dame at Dijon, Cathedral Auxerre) and in Normandy (cathedrals of Coutances, Bayeux, Lisieux, and Sées), while the Ile-de-France, Picardy, and Champagne are practically one school. If a single building were selected to typify perfect Gothic, it would be Amiens Cathedral, for both internal and external effects. The exaggeration of delicacy and height next attempted at Beauvais Cathedral was both constructively and æsthetically a failure as already explained.

There is, however, no perfect west façade of this best period, for the façade of Amiens was not completed until 1288; that of Rheims not till

1380; while many other west fronts belong to the Flamboyant period, e.g., Rouen, Tours, Troyes. With the later Flamboyant works Gothic architecture expired in France, overborne and supplanted by the tide of the Renaissance (q.v.).

Consult the various histories of architecture; also Moore, *Development and Character of Gothic Architecture* (New York, 1899); Viollet-le-Duc, *Dictionnaire raisonné de l'architecture française* (Paris, 1854-68); Lassus, *Notre Dame de Paris* (ib., n. d.); Ducloux and Doury, *La Sainte Chapelle de Paris* (ib., n. d.); Enlart, *Archéologie française*, vol. i (ib., 1902-04); Hasak, *Die gotische Baukunst: der Kirchenbau in Handbuch der Architektur* (Stuttgart, 1887-1904); Dehio and Bezold, *Kirchliche Baukunst des Abendlandes* (ib., 1887-1901); Corroyer, *L'Architecture gothique* (Paris, 1891); *Archives of the Commission des monuments historiques* (ib., 1855-72); Durand, *Monographie de l'église Notre-Dame Cathédrale d'Amiens* (Amiens, 1901-03); Gurlitt, *Die Baukunst Frankreichs* (Dresden, 1900).

**Great Britain.** As the Gothic style in France developed out of the Romanesque, so in England it developed out of the Anglo-Norman, but along strictly national lines, although the initial step in this development was taken by a French architect, William of Sens, summoned in 1174 to rebuild the choir of Canterbury Cathedral after the disastrous fire of that year. The ribbed groined vault had already (as is now believed) been used over the nave of Durham Cathedral, but at Canterbury we have a nearly complete Gothic system. Lincoln Cathedral choir and transepts, begun in 1190, display the system applied in a distinctly English fashion, and from that time on all trace of French influence disappears, except in Westminster Abbey (1245-1490), whose plan and proportions are French, though its details are absolutely English. The English Gothic churches of the first rank—abbeys and cathedrals—differ from the French in fundamental ways. In plan they are longer, narrower, with square instead of apsidal east ends (q.v.), with longer transept arms having sometimes one side aisle, sometimes two, sometimes none, and sometimes with secondary transepts near the west front. They are much lower than the French; the Wells vault is but 63 feet high, Salisbury's 85, and Westminster Abbey's, the highest of all, is less lofty than that of Notre Dame at Paris—it measures 103 feet in height.

The English churches are in internal architecture far richer decoratively than the French—the piers more richly clustered, with shafts of black Purbeck marble; the moldings finer and more complicated, and the vaulting built with multiple ribs, producing highly decorative effects. On the other hand, the exteriors were less ornate than the French not only in having fewer pinnacles and flying buttresses, but in their lack of tabernacles and figure sculpture and in the insignificance of their portals. There was no fixed type of west front; York, Lincoln, Wells, Canterbury, Westminster, and Beverley have twin square western towers; Lichfield and Chichester, twin spires; Peterborough, Salisbury, Winchester, Exeter, and others have no western towers. Some of the fronts are mere screens; others, more logically designed, are uninteresting (Winchester). The finest external feature is the central crossing tower, replacing the French lantern, or *flèche*; these towers, mostly built after

1350, were usually square (Lincoln, Gloucester, Canterbury, York, etc.), but capped with a spire at Chichester, Lichfield, and Salisbury—the last named, 424 feet high, one of the most beautiful of all Gothic spires. English window tracery was developed more systematically and is on the whole more interesting than the French; the great east and west windows of the cathedrals are especially notable. (See TRACERY.)

English Gothic architecture, like the French, passed through three well-marked periods. In the first, called the *Early English* (q.v.), from 1175 to about 1250, we observe (as Professor Moore has well pointed out) what is structurally a transitional Romanesque with pointed arches and Gothic details; the lancet windows are still small, the walls thick, the piers massive. In the second, or *Decorated* (q.v.), the Romanesque or Anglo-Norman characteristics tend to disappear; the windows, greatly enlarged, have superbly decorative geometric tracery; and the decorative elements of the interior are greatly multiplied and enriched. The French structural device of the vault rib is logically extended and elaborated by multiplying the ribs (tiercerons and liernes; see VAULTING). The third, or *Perpendicular*, period (1360 or 1375 to 1525) was marked by the building of many fine parish churches and by the superb chapels of St. George at Windsor, King's College at Cambridge, and Henry VII at Westminster Abbey. It is the most logical, structurally, of the three English styles, in the French sense, i.e., in the suppression of wall surfaces and the external expression of plan and structure. It was, however, during this period that fan vaulting (q.v.) was developed, in which the multiplied tiercerons and liernes were converted into a purely decorative apparel of carved paneling, their structural origin and use thus being wholly lost. (See VAULTING.) Its name is derived from the character of its tracery—the least decorative of all the historic types. The naves of Canterbury and Winchester were rebuilt in this period. To the first period belong, in the main, Lincoln, Salisbury, and Wells cathedrals and Canterbury choir; to the second, the naves of York, Lichfield, and Beverley cathedrals, and the greater part of Westminster Abbey. But hardly any cathedral or great church in England was built originally in one period in its present form; many show all the styles, from the Anglo-Norman to the Perpendicular. Particularly worthy of notice are many of the great parish churches with fine central west towers, as at Boston; or spires, as St. Mary Redcliffe at Bristol.

Special and interesting developments are seen in the semiecclesiastical academic and collegiate architecture of the universities and great mansions, especially of the fifteenth century; and in the superb "open-timber" ceilings of many late halls and churches, in which the hammer-beam (q.v.) truss is used with as clear logic and artistic skill as the French vaults of stone display. Mention must also be made of another exclusively English development, in the polygonal chapter houses of York, Wells, Salisbury, Lincoln, and Westminster. All but that of York have superb stone vaults springing from a central clustered shaft, and in design and construction they represent a remarkable achievement in the combination of structural logic with artistic purpose.

Consult: Scott, *English Church Architecture* (London, 1881); Prior, *A History of Gothic Art*

*in England* (ib., 1900); Bond, *Gothic Architecture in England* (ib., 1906); id., *Cathedrals of England and Wales* (ib., 1908) and *An Introduction to English Church Architecture* (ib., 1913); Fairbairns, *Cathedrals of England and Wales* (4 vols., ib., 1907); Moore, *Medieval Church Architecture in England* (New York, 1912); Van Rensselaer, *English Cathedrals* (ib., 1892). See authorities under ROMANESQUE ART; EARLY ENGLISH STYLE; PERPENDICULAR STYLE.

**Germany.** It is difficult to find a consistent character in German Gothic. It never became a national style, as in France and England. The Romanesque style had had so superb a development in Germany that it was difficult to introduce a new style, and not until French Gothic had reached its fullest expression in France did it find a foothold. The cathedral at Limburg copies Noyon and is still plain and heavy (1235). The singular Liebfrauenkirche at Treves (1227), on a circular plan with 12 foils, in architectural style a copy of the French church of Saint-Yved at Braisne, is the first purely Gothic church. It was natural that the Rhineland should first adopt the new style, not only from its proximity, but because it excelled other provinces artistically. On the other hand, the Germans evolved a distinctly national type in their "hall churches," with nave and aisles of equal height, of which St. Elisabeth at Marburg is an early example; later ones are at Nuremberg (St. Sebald) and Breslau (Kreuzkirche). The supremacy of the Rhineland is emphasized in the second half of the thirteenth century in three great churches—the cathedrals of Strassburg, of Freiburg, and of Cologne, where French influence is almost unmixed with German peculiarities; purest of all is the choir of Cologne (finished 1320), built long before the nave, which was not completed until late in the nineteenth century. In these Rhenish cathedrals there is much figured sculpture, which in the west portals at Strassburg equals the finest French work. Peculiarly German is the use of tracery as a purely external decoration, as embodied in the façade and spire of Strassburg and the spire at Freiburg, like delicate lace openwork. The cathedral of Halberstadt and the abbey churches of Altenberg and Xanten belong to the same style. The great cathedrals influenced a multitude of construction, especially throughout the Rhineland, and led to the formation of a German version of Gothic, much less pure, much less artistic, but interesting as a national expression, though varying in detail in local schools, as in the upper Rhine (Oppenheim), in Swabia, and Bavaria. With the middle of the fourteenth century the territory occupied by Gothic architecture had immensely increased. Nuremberg had become a great centre (St. Lawrence, St. Sebald, Frauenkirche). Great cathedrals and minsters were undertaken at Regensburg and at Ulm; also in Austria (St. Stephen, Vienna). Although great pains were taken with the decorative work, it was often lacking in artistic quality, showing in its place the German fondness for the fantastic and for ingenious mechanical intricacy of execution. The decorative vaulting ribs are not so pleasing nor so appropriate structurally as the English; the foliage work on capitals, friezes, etc., is stiff and unnatural; the proportions are not happy. One of the least happy phases was the brick architecture of the north in the Baltic Provinces and north Prussia. Consult the au-

thorities referred to under ROMANESQUE ART; also Moore, *Gothic Architecture: Its Development and Character* (London, 1899); Dehio and Bezold, *Die kirchliche Baukunst des Abendlandes* (Stuttgart, 1887-1901); Lübke, *Ecclesiastical Art in Germany during the Middle Ages*, trans. by Wheatley (Edinburgh, 1873); Hasak, *Die gotische Baukunst der Kirchenbau*, in Stuttgart series *Handbuch der Architektur* (Stuttgart, 1887-1904).

**Belgium and Holland.** The Gothic of Flemish towns partook of both French and German characteristics; the German being paramount in Holland, as in churches at Utrecht, Leyden, Haarlem, etc.; the French in Belgium, as at Sainte-Gudule in Brussels and at Tournai. In the fourteenth century by the side of such great cathedrals as Antwerp, with its seven aisles and its magnificent spire, Malines, and Louvain, already corrupt in taste, are the Flemish guild-halls and town halls of Ypres, Bruges, Louvain, Mechlin, Ghent, Brussels, and Oudenarde. Consult Van Ysendyck, *Documents classés de l'art dans les Pays-Bas* (Antwerp, 1880-91).

**Spain.** The hybrid Byzantine-Moresco-Basilical architecture current in the Christian parts of Spain during the Moorish supremacy was beginning to be superseded by a Romanesque style of great dignity, borrowed from the south and west of France, when the French architects who were introducing it felt the first inroads of the early Gothic style—that of Saint-Germer, tempered by the Cistercian simplicity. The old cathedral of Salamanca (close of twelfth century), with its heavy proportions but genuine Gothic vaulting, shows in certain features, especially in its interesting ribbed dome, an original interpretation of Gothic principles. San Vincente at Avila, the abbey church at Veruela, and the cathedrals of Lérida, Tudela, and especially Tarragona, belong to the same period and style of heavy transition from Romanesque to Gothic. This group is as effective, well composed, and imposing as any in Europe of this time. But we do not see the links that connect it with the developed Gothic of Burgos, Toledo, León, Valencia, and Barcelona cathedrals, built in the thirteenth century, because this style was not an indigenous outcome of the older buildings, but was brought straight from France. These and other buildings of less importance are in great measure reproductions of the best French models—especially of the types of Amiens and Rheims—so that the Spanish Gothic of this middle period is second only to the French in its purity and consistency. Toledo is the most purely French of the five, León next to it. Burgos departs furthest from French types in its late Gothic *cimborio*, or lantern, and its very German traceried spires. Figure sculpture is much less important than in the French models, and these Spanish churches are more massive and less lofty than the French. The Romanesque love of heavy wall masonry persists, and the round arch is retained quite late in the main portals. Perhaps Burgos presents, on the whole, the richest and most artistic exterior, as to towers, façade, and general composition. The unity of style was sadly disturbed in the fourteenth and succeeding centuries. English, German, southern French, Italian, and Flemish elements were introduced, all more or less deviating from true Gothic design, and the national passion for rich decoration led to much extravagance in ornament and

details. Of this late and surcharged phase of Gothic architecture the monastery of Belem and the mausoleum of Manoel II at Batalha in Portugal are the finest examples. But during the fifteenth century and even in the sixteenth, notable examples of Gothic design were erected, mainly free from faults of overcharged ornament, though somewhat thin and wiredrawn in detail. The nave of Seville, the entire new cathedral at Salamanca, and the fine cathedral of Segovia belong to this period. Some of the Spanish churches are immense. The Toledo Cathedral was already one of the largest in Europe, but Seville Cathedral, begun in 1401, is the largest of all mediæval structures, measuring 415 × 298 feet, or nearly 120,000 square feet.

Consult: Street, *Gothic Architecture in Spain* (London, 1865; new ed., 1914); Junghändel and Gurlitt, *Die Baukunst Spaniens* (Dresden, 1891-93), with photographic illustrations; Gade, *Cathedrals of Spain* (New York, 1911); *Monumentos arquitectónicos de España*, in course of publication by the Spanish government.

**Italy.** We can speak of a Gothic age but not of a Gothic style, in Italy, if by "Gothic" we mean the embodiment of the structural logic which to greater or less degree dominated the mediæval architecture of the countries so far discussed; for the Italians never mastered, nor cared to master, the principles underlying Western Gothic construction, but adopted at their good pleasure, and with modifications to suit their genius, a good proportion of western Gothic forms. The first Gothic inroads naturally appear to be by the hand of Frenchmen, such as the Cistercian monasteries of Fossanova, Casamari, San Galgano, and San Martino, as well as the gem Sant' Andrea at Vercelli, all belonging to the primitive transitional style. Then, at the mother church of the Franciscan Order, San Francesco at Assisi, the Gothic type was accepted by these monks as it was by the Dominicans. These two orders were the main agents for diffusing Gothic forms throughout Italy; for, strange to say, while northern Europe was replacing monastic architects by lay guilds in imitation of what Italy had done earlier, Italy meanwhile veered about, and nearly all her architects during the thirteenth and fourteenth centuries were monks. It is in the churches of these two orders at Bologna (San Francesco, San Domenico), Florence (Santa Maria Novella, Santa Croce), Venice (Santi Giovanni e Paolo, Santa Maria dei Frari), Rome (Santa Maria sopra Minerva), Treviso, etc., that the Italian Gothic type of church was developed, and the requirement insisted on by these preaching orders, of an interior suitable as an auditorium, determined largely their artistic character. Nowhere else are there so many churches of a single nave or with aisles nearly as lofty as the nave.

But in all these both the structural logic and the general aspect of the Western Gothic is wanting; the hold of classic tradition on the Italian taste was still strong; large wall surfaces, small windows, and large units of design were preferred to the small scale of parts, the broken surfaces, the suppression of the wall, characteristic of the French Gothic. The Italians built well, but they were decorators first of all; a church interior must offer surfaces for painting; the exterior, surfaces for marble veneer and mosaic; the west front, a screen of any desired outline, to receive carving, sculpture, and

inlay. The frank resistance to vault thrusts by flying buttresses was repugnant to Italian taste; they preferred internal tie-rods of iron. Tracery was, of course, but little developed in the small Italian windows, though there are a few good examples in Florence, Pisa, and Milan.

Many so-called Gothic buildings, such as the cathedrals of Orvieto, Siena, and Lucca, are round-arched or wooden-roofed, or have columns in place of grouped piers, so that we miss every Gothic element. Even where groin vaulting is used—as at Santa Maria Novella at Florence, and Sant' Anastasia at Verona, two of the most beautiful examples in Italy—one misses the moldings of the grouped piers connecting structurally with the arcades and vaults. The wide spacing of the piers, the height of the aisles, and the lack of detail make the interiors look much smaller than they are. The rich polygonal choir with radiating chapels is almost unknown. In most parts of Italy the thirteenth century was a sterile period. There was little building in Sicily and the south. Rome suffered from the papal exile. The Lombard cities lost their freedom under tyrants. Only Venice, Florence, Siena, and neighboring cities produced much that was notable. By the end of the fourteenth century cathedral architecture had adopted Gothic features, as in the *duomo* (cathedral) of Florence, and in the most pretentious and un-Italian of cathedrals, that of Milan, in which German architects were employed, as well as in the huge parish church of San Petronio at Bologna. The bareness of the Italian interiors was occasionally redeemed by fresco paintings, as in San Francesco at Assisi. It was in civil architecture that the Italians excelled. The private palace of Venice, beginning as a Byzantine and Romanesque type, developed during the Gothic period into a beautiful creation, whose climax is the *Cà d'Oro* and the Doge's Palace. The type spread to the mainland at Padua, Vicenza, Udine, and elsewhere. The fortress palace is a different type, especially well developed at Florence, with its heavy bossed work and stern aspect. The communal palaces were monuments rivaling the cathedrals; those at Florence (Palazzo Vecchio, Bargello, etc.), Siena, Perugia, Gubbio, and those farther north at Brescia, Bergamo, Cremona, Milan, Padua, etc., are superb compositions. Consult: Mothes, *Die Baukunst des Mittelalters in Italien* (Jena, 1884); Street, *Brick and Marble Architecture of North Italy* (London, 1874); Fleury, *La Toscane au moyen âge* (Paris, 1874); Cumings, *A History of Italian Architecture* (2 vols., Boston, 1901).

**GOTHIC ART.** The term was originally applied by the Italians to the pointed architecture which preceded the Renaissance in derision of its supposed barbaric character. The general adoption of this term was promoted by the erroneous idea that there was something essentially Germanic in the style, and the term, though unscientific, has been too long in general use to be discarded. The Gothic period extends, roughly speaking, from the twelfth to the fifteenth century. It was a period of French ascendancy, during which artistic influences radiated from France over the rest of Europe. The control of art passed from the hands of the clergy into that of lay guilds. Gothic art had its root in the life of the cities. Nevertheless, it bore the impress of chivalry, being marked

by a gentleness and charm which sometimes degenerated into sentimentality. It possessed a keen sense of humor and mockery, as is especially shown in its grotesque sculptures, and at the end of the period there was a decided tendency towards realism. During this time sculpture and painting, though highly developed, were decorative in character and strictly subordinated to architecture, to which, therefore, a separate article has been given. See **GOTHIC ARCHITECTURE**.

#### SCULPTURE

**France.** The School of the Ile-de-France, where Gothic architecture originated, also began the use in the lower portals of statues, at first severely stiff. About 1210-20 statues of this character became freer and more artistic, though remaining part of the architecture. Among the best early examples are the portals of the cathedral of Laon and the western portal of Notre Dame (q.v.) at Paris (1225). During the thirteenth century the use of statuary grew to an extent never before nor since practiced. It was concentrated upon the exterior of the buildings, centred about the portals, both of those of the façade, which usually terminated in three great pointed arches, and those of the side, which were often double. In order to accommodate the multitude of statues the portals were extended into porches. They were lined by rows of statues, and the tympanums were filled with reliefs. Great cathedrals of the thirteenth century were decorated with thousands of statues—like the façade of Notre Dame; the porches of Chartres, the portals, both façade and lateral, of Rheims, called the Parthenon of the Middle Ages because of the beauty and delicacy of the statuary; and Amiens, where the majestic statue of Christ, "Le bon Dieu," is eminent among many of high excellence. The subjects represented were usually biblical and allegorical cycles, like the "Creation" and "Fall of Man"; Old and New Testament history, usually terminating in the "Last Judgment," a favorite subject; allegorical figures of the trades and industries, of virtues and vices. They were, in fact, the translation into stone of the religious and philosophical ideas of the day—Bibles and sermons in stone. Occasionally the figures were executed after nature, but more usually in accordance with geometrical canons, so comprehensive that even mediocre artists could do good work. The treatment of the nude was crude, but high success was attained in draperies, which will even bear comparison with the products of Greek art. Though realistic, the figures are always of a deep religious feeling and full of dignity. This, however, is lost in the late thirteenth and fourteenth centuries, when French sculpture aims increasingly at realism, becoming naïve and humorous. The centre of artistic activity shifts to Flanders and northern Burgundy, where there was great activity at Dijon, under patronage of the Burgundian dukes. The surviving masterpiece of the school is Claus Sluter's (q.v.) "Fountain of Moes." An admirable collection of French sculpture of the late Gothic period in all its forms is on exhibition in the J. Pierpont Morgan collection and the Wing of Decorative Arts in the Metropolitan Museum of Art, New York. The English Gothic, with few exceptions, like the façade of the cathedral of Wells, was not adapted to sculptural decorations. The most important manifes-

tation of sculpture here is in sepulchral monuments, funeral slabs and brasses, in which much realism is manifest. In northern Spain Gothic sculpture was at first influenced by French models. The façade of the cathedral of Santiago de Compostela is decorated with a wealth of statuary hardly second to that of the great French cathedrals. In the fifteenth century the French was supplemented by a German influence. The final development of Gothic sculpture in Spain was a decorative art rich to the point of profusion, as may be seen in such works as the church and cloisters of San Juan de los Reyes at Toledo, the façade of San Juan at Valladolid, and the tomb of King John II at Miraflores (near Burgos).

**Germany.** The thirteenth century was the golden age of German mediæval sculpture, which was doubtless influenced by contemporary French art. As the Germans still built in the Romanesque style, their churches did not afford opportunity for great cycles of plastic art, as did those of France. Their activity was confined to the interior of the church between the arches, the walls of the choir, the altar, and the pulpit; exterior decoration was rare and only practiced at the end of the epoch. The figures were full of life and dignity, less realistic than the French, and representing a calmer, higher ideal. As in the Romanesque epoch, the Saxon and Franconian schools lead. The early work of the Saxon school is best represented by the apostles and angels in the choir of the church of St. Michael, Hildesheims, and its highest development in the church of Halberstadt. Heavier and more impassioned are the figures of the South Saxon school, as exemplified in the reliefs of the pulpit and the "Crucifixion" at Wechselberg; the famous "Golden Portal" at Freiburg, the sculptures of which represent, in a grandiose manner, the "Revelation of the Kingdom of God to Man by Christ"; and that most beautiful of German sepulchral monuments, the tomb of Henry the Lion and his wife Matilda in the cathedral of Brunswick. The school reached its culmination in the latter part of the thirteenth century in the statues of the benefactors of the Church in the cathedral of Naumburg—simple, realistic, and dignified, and superb in treatment of drapery. Of equal excellence are the contemporary statues by the Franconian school in the cathedral of Bamberg, of which the "Ancient Sibyl" is the best known. The Rhenish school followed the French more closely, as is evident in the church of the Virgin at Treves and in the minsters of Freiburg and Strassburg. More characteristically German are the sculptors of the Nuremberg churches, chiefly reliefs with small figures. In the fifteenth century sculptures in wood took the place of stone, with a change of style, though not of ideals, corresponding to the new material. The figures were treated with sharper lines, and the draperies in wrinkles instead of folds; both figures and draperies were colored. From this period date the finest Gothic altars and other ecclesiastical furniture of wood. The two chief schools were the Franconian, with Nuremberg as a centre, and the Swabian at Ulm. The chief artist of the latter was Joerg Syrlin the elder, whose chief work is the choir stalls in the minister of Ulm (1469-74). The Germanic Museum and the churches of Nuremberg contain fine examples of the wood carving of that school. The chief artists were Michael Wohlgenuth

(q.v.) and Veit Stoss (q.v.), who transplanted the art to Cracow, Poland. His latest and best work, however, falls in the Renaissance period.

**Italy.** The school of Pisa was the first to achieve the revival of sculpture in Italy, in the person of Niccola Pisano (c.1206-78). Though belonging to the Gothic epoch, his sculptures owe all their inspiration to the antique, forming a sort of Proto-Renaissance. (See SCULPTURE, *History*.) His son Giovanni (c.1250-c.1320), however, accepted the dramatic and naturalistic elements of Gothic art, and under Andrea Pisano, who was chiefly active in Florence, Gothic sculpture reached its highest development between 1310 and 1335. (See PISANO.) Its chief monuments in Tuscany are the sculptures of the façade of the cathedral of Orvieto, the marble reliefs on the campanile, and the bronze doors of the baptistery of Florence. The style was further developed by the Florentine Andrea Orcagno (c.1329-68) (q.v.), whose masterpiece is the tabernacle of Or San Michele. The most important school outside of Florence was that of Siena, whence the art was transplanted to Naples and Lombardy, with Verona as a centre. In Lombardy the school developed a series of sepulchral monuments of great magnificence and originality, the most important of which are those of the Scaliger family. The Roman school of sculpture, which came to an end c.1300, was not properly Gothic, but found all its inspiration in antiquity. (See COSMATIC.) In like manner the admirable South Italian school, which developed in the early thirteenth century under the patronage of the Emperor Frederic II, found its inspiration in Greek originals. (See ROMANESQUE ART.) As elsewhere, marble and stone were the chief materials used,\* though bronze casting was brought to high perfection by Andrea Pisano. Italian sculptors lacked the imagination of the French, their subjects being the traditional ones of the Old and New Testaments.

#### PAINTING AND ALLIED ARTS

The breaking up of the wall surfaces in Gothic art left little opportunity for painting. There was, however, an increased opportunity for stained glasses (see STAINED GLASS), which during this epoch attained their highest development. The windows of the great French cathedrals were treated so as to form cycles of biblical stories and Christian legends, showing the substance of the Christian doctrine. Most of these cycles have perished, but remains survive in the chief cathedrals. The most perfect thirteenth-century example is the cathedral of Chartres, with its 146 windows; the glasses of the Sainte Chapelle in Paris have been so perfectly restored as to give an excellent idea of the best period. Good English examples are to be found in the cathedrals of Salisbury, Lincoln, and York. In the fourteenth century came a decisive change with the introduction of architectural forms in stained glasses, which had heretofore been in patterns more like tapestry. In France such windows are most frequent in the cathedrals of the south and in private houses; but the finest examples are in Germany, especially in the cathedrals of Cologne and Strassburg.

In Germany the buildings of the transitional style afforded more opportunity for mural paintings. On the Rhine a school arose at Cologne, in the fourteenth century, the mystic and sen-



timental inclinations of which show French influence. A Bohemian school flourished near Prague under the patronage of the Emperor Charles IV, the chief characteristic of which was a harsh realism. Midway between the two were the Franconian school, with a centre at Nuremberg, and the Swabian, the beginnings of which both fall in the fourteenth century. But towards the end of the fourteenth century painting in northern Europe began to lose its decorative character. The panel replaced fresco (q.v.), and with its use painting became an independent art. This change, which occurred first in the Netherlands in the works of the brothers Van Eyck (q.v.), emancipated painting from the bonds of the Gothic. It is more fully treated under PAINTING.

In Italy the large wall spaces of Gothic architecture afforded ample opportunity for mural painting, with the result that the later thirteenth century saw the rise of an important school of fresco painting, which culminated in Giotto (q.v.), the Florentine, and flourished throughout the fourteenth century. A little earlier the Siennese, beginning with Duccio (q.v.), who followed Byzantine models, developed an important school of panel painting. Although both the Florentine and the Siennese schools belong in time and in spirit to the Gothic epoch, their importance in the development of painting is such as to merit fuller treatment in the article PAINTING.

**The Decorative Arts.** The Gothic is one of the most important of all epochs in the decorative arts. Its principles were applied to all articles of ecclesiastical and worldly use with a consistency and purity comparable to the Greek and Byzantine epochs. The general subject is treated under the caption DECORATIVE ART; with more detailed treatment under such subjects as INTERIOR DECORATION; FURNITURE; TAPESTRIES; COSTUME; JEWELRY; PLATE; and the like. Especial mention should be made of the innumerable articles of ecclesiastical usage treated under such general heads as ENAMEL and IVORY CARVING, and such individual titles as ALTAR; CRUCIFIX; SHRINE; MONSTRANCE; ETC.

**Bibliography.** A good general treatment of Gothic art is found in the excellent, compendious histories of art recently published, the titles of which are enumerated in the bibliography of art; especially in the histories by Woermann, Springer, and Michel. For a still briefer treatment, see such manuals as Reber, *History of Mediæval Art* (New York, 1887), and Lethaby, *Mediæval Art* (London, 1904). SCULPTURE. France: Emeric-David, *Histoire de la sculpture française* (Paris, 1872); Baudot, *La sculpture française au moyen âge et à la renaissance* (ib., 1884); Frothingham, in *American Journal of Archaeology* (New York, 1885); Pillon, *Les sculpteurs français du XIII<sup>e</sup> siècle* (Paris, 1912); Humbert, *La sculpture sous les ducs de la Bourgogne* (ib., 1913). Germany: Bode, *Geschichte der deutschen Plastik* (Berlin, 1887); Hasak, *Geschichte der deutschen Bildhauerkunst im xiii. Jahrhundert* (ib., 1899); Sauerlandt, *Deutsche Plastik des Mittelalters* (Düsseldorf, 1900). Spain: Lafond, *La sculpture espagnole* (Paris, 1908); Calvert, *Sculpture in Spain* (London, 1912). England: Prior, *A History of Gothic Art in England* (London, 1900); Prior and Gardner, *An Account of Mediæval Figure Sculpture in England* (Cambridge, 1912). Italy: Perkins, *Handbook of Italian Sculpture*

(New York, 1883); Venturi, *Storia dell' arte italiana*, vols. iii, iv, v (Milan, 1902), the most scholarly account; Zimmermann, *Oberitalische Plastik im frühen und hohen Mittelalter* (Leipzig, 1897); Waters, *Five Italian Shrines* (London, 1906); and the manuals of Italian sculptors by Evelyn and Walters cited in the bibliography of SCULPTURE.

**GOTHIC JURISPRUDENCE.** The law of the Gothic invaders who established themselves on the ruins of the Roman Empire in western Europe. The Goths had originally the same law as the other Germanic races, it being administered on the whole by the family, and only very grave criminal offenses being dealt with by the state. What makes Gothic jurisprudence especially interesting is the adoption of the Roman law and its codification. This is true of the Visigoths rather than of the Ostrogoths, who merely used the Byzantine law as it existed in Italy upon their invasion. Side by side with this, their own native law continued in force. In Spain, however, Alaric II, King of the Visigoths, in 506 issued a codification of the Roman law, the *Lex Romana Visigothorum*, better known as the *Breviarium Alaricianum*. It was revised by King Egica (687-701) and until the thirteenth century remained the chief source of Roman law for western Europe. As such, it exerted a great influence on the development of law, especially in Spain, where Ferdinand III (1217-52) introduced it under the title of *Fuero juzo* (Lat. *forum judiciale*). Consult: Pollock and Maitland, *History of English Law*, vol. i (2d ed., Oxford, 1899); Zeumer, "Lex Visigothorum," in *Monumenta Germaniæ historica, Leges, sectio I* (Hanover, 1894). See CIVIL LAW.

**GOTHIC LANGUAGE** (Lat. *Gothicus*, from *Gothus*, Gk. Γόθος, *Gothos*, Γόθων, *Gythōn*, from Goth. *Gutþiuda*, Goth-people, AS. *Gōtan*, OSwed. *Gutar*, *Gotar*, Goths; cf. dialectic Norw. *gut*, boy). The language spoken by the Goths (q.v.). Excepting the Old Icelandic runic inscriptions (see RUNES) and a few Germanic glosses and proper names preserved in classical authors, such as Cæsar and Tacitus, Gothic is the oldest monument of all the dialects of the Germanic group of Indo-Germanic languages. Like Anglo-Saxon, Frisian, and Old Icelandic, it has undergone only the first sound shifting, or ablaut, and is consequently one of the Low Germanic languages, as contrasted with Old High German, where the second sound shifting has been carried through. (See GRIMM'S LAW.) Within this Low Germanic subgroup it is most closely akin to the Scandinavian (Old Icelandic, Old Norwegian, Old Swedish, Old Danish, and their modern representatives), so that some scholars class Gothic and Old Scandinavian together as East Germanic, contrasting this group with the Anglo-Frisian and High Germanic languages, which are then termed West Germanic. The most important points of coincidence between Gothic and Icelandic are the development of Germanic *gy* to *gwo* (as Goth. *triggus*, OIcel. *tryggv*, true, but AS. *trēowe*, OHG. *triuwi*), and the retention of final *z* (Goth. *s*, OIcel. *r*), which is lost in West Germanic (as Goth.  *dags*, OIcel. *dagr*, day, but AS. *dæg*, OHG. *tag*). On the other hand, Gothic and Scandinavian diverge in many respects, especially in declension and conjugation (as runic Norse *þótrrīR*, daughters, but Goth. *dohtrjuz*; runic Norse *tawīþo*, I did, but Goth. *tawida*). It therefore seems better, on



the whole, to regard Gothic and Scandinavian as belonging to different groups, which may be termed East and North Germanic respectively.

The sources of our knowledge of Gothic are limited. The earliest gloss preserved is in Isidor of Seville, who cites the words *medus*, mead, and *reptus*, garment. The Lex Visigothorum also contains a few Gothic words, as *leudes*, people, and *saio* (whence the Sp. *sayon*), beadle. The most important and extensive remnant of the language is the fragments of the translation of the Bible by Ulfilas (q.v.), contained in the *Codex argenteus*, now in Upsala. There are also a few words, chiefly proper names, in two documents found at Naples and Arezzo, and a fragment of a calendar.

In phonology and inflection Gothic is the most primitive of all the Germanic languages. Its pronunciation is fixed by our knowledge of that of Greek in the fourth century. Thus, as *ei* in Greek then had the itacistic value of *i*, *i* is represented in Gothic by *ei*. Similarly *ng* is written *gg* in Gothic in conformity with the Greek use of *γγ* instead of *νγ*. The vowels and consonants correspond in general to the pre-Germanic phonology. Short *e*, however, does not occur, being changed to *i* (as OHG. *neman*, to take, but Goth. *niman*), which is written *ai* before *h* and *r* (as Goth. *airpa*, earth, *rahts*, right, but OHG. *erda*, *reht*), exactly as *u* is written *au* in a similar position (as Goth. *waürms*, worm, *saühts*, sickness, but OHG. *wurm*, *suht*). Pre-Germanic *z*, which became *r* in the other Germanic languages, remained *z* in Gothic, but sometimes, for reasons not yet altogether clear, it was changed to *s* (as Goth. *ausō*, ear, but OHG. *ōra*). The declension does not differ materially from the Germanic type. The pronouns of the first and second persons have, as in Old Icelandic, Anglo-Saxon, and Old Saxon, a dual. The conjugation of the verb, while harmonizing in general with the Germanic type, is marked by a number of important features. Gothic is the only Germanic language in which the verb retains the dual number (as *baitrōs*, we two bear, *baitrats*, ye two bear, Skt. *bharāvas*, *bharathas*; *baitrainwa*, we two bore, Skt. *abharāva*), and the third person of the imperative (*baitradau*, let him bear, *baitrandau*, let them bear, Skt. *bharatu*, *bharantu*). The reduplicated preterit, which is very rare in other Germanic languages, is frequent in Gothic, 11 preterits of this type being found in the scanty remnants of the literature. As examples may be cited: *faiſūh*, from *fahan*, to seize, *haiſait*, from *haitan*, to call, *raitrōp*, from *ređan*, to counsel, *saisū*, from *sayan*, to sow. For all these preterits the Anglo-Saxon, e.g., has as corresponding forms, *feng*, *heht*, *reord*, *sēow*. Most noteworthy of all, however, is the fact that Gothic, unlike any other member of the Germanic group, possesses a middle voice in other verbs than *haitan*, to call. Thus, Goth. *baitraza*, thou bearest thyself, *baitrada*, he bears himself, *baitranda*, they bear themselves, correspond to Sanskrit *bharasē*, *bharatē*, *bharantē*.

In its vocabulary Gothic has a number of Indo-Germanic words which are not found in the other Germanic languages, as *us-anan*, to breathe forth, Lat. *animus*, breath; *aijis*, other, Lat. *alius*. On the other hand, it has no etymological representation of such common Germanic words as *do*, *say*, *fall*, *mother*, for which it substitutes *tauſan*, *qipān*, *driusan*, *aipei*. As might be expected in a translation of the Bible, Greek and Latin loan words are quite numerous. It has

likewise borrowed a few Celtic words, as *kēlikn*, tower, from Gallic *celicnon*, *reiks*, Ger. *Reich*, from Gallic *riw*, and two from the Slavic *plimejan*, to dance, and *smakka*, fig (cf. OChurch Slav. *plęsati*, smoky).

Literary Gothic is sometimes termed West Gothic, to distinguish it from East, or Krim, Gothic. The Crimean Goths preserved their identity until the sixteenth century. A collection of 86 Krim Gothic words was made in 1595 by a Fleming named Busbeck. The list, which is of great value as being the only remnant of this dialect of Gothic, is in general accurate, although some errors naturally crept in, as *hazer*, thousand, which is a loan word from Persian *hazār*. It adds a number of words to the Gothic vocabulary, as *miera*, ant, *rinck*, ring, *ada*, egg, *waghen*, wagon. In phonology Krim Gothic seems to have differed from the language of Ulfilas. The vocabulary of Busbeck contains little information on inflection. If we may judge, however, from such hints as Krim *oeghene* beside Goth. *augōna*, eyes, Krim *ahte*, eight, beside Goth. *ahtau*, Krim *singhen*, to sing, beside Goth. *siggwan*, Krim *tag* (for \**dag*), day, beside Goth. *dags*, it would seem that a change had taken place within the 12 centuries between Ulfilas and Busbeck, which was, roughly speaking, analogous to the transition from Old to Middle High German.

To the same East Germanic group as the Gothic belong the Vandal and Burgundian languages, of which only scanty fragments, chiefly proper names, survive.

The Gothic alphabet was invented by Ulfilas. He took as his basis the Greek letters, adding some Latin characters, and a few signs from the runes which were previously in use among the Goths. The number of letters was 27, of which two, corresponding to the Greek koppa and sampi, had numerical values alone, and a third, the equivalent of the Greek chi, was used only in foreign proper names. The alphabet really consisted, therefore, of 24 letters, which are, in modern editions of Gothic texts, transliterated into the ordinary Roman alphabet with the addition of *þ* and *h*.

Consult: Ulfilas, ed. by Stamm (10th ed. of Heyne and Wrede, Paderborn, 1903); Bernhardt, *Kurzgefasste gotische Grammatik* (Halle, 1885); Braune, *Gotische Grammatik* (5th ed., ib., 1900); Streitberg, *Gotisches Elementarbuch* (Heidelberg, 1896; 3d and 4th ed., Heidelberg, 1910); Wright, *Primer of the Gothic Language* (2d ed., Oxford, 1899); Kluge, "Geschichte der gotischen Sprache," in Paul, *Grundriss der germanischen Philologie*, vol. i (2d ed., Strassburg, 1901); Skeat, *Mæso-Gothic Glossary* (London, 1868); Balg, *Comparative Glossary of the Gothic Language* (Mayville, Wis., 1887-89); Feist, *Grundriss der gotischen Etymologie* (Strassburg, 1888); Uhlenbeck, *Kurzgefasstes etymologisches Wörterbuch der gotischen Sprache* (2d ed., Amsterdam, 1900); Tomaschek, *Die Goten in Taurien* (Vienna, 1881); Loewe, *Die Reste der Germanen am Schwarzen Meere* (Halle, 1896); Wrede, *Ueber die Sprache der Wandalen* (Strassburg, 1886); id., *Ueber die Sprache der Ostgoten in Italien* (ib., 1891); Leyen, *Einführung in das gotische* (Munich, 1908); Feist, *Etymologisches Wörterbuch der gotischen Sprache mit Einschluss des Krimgotischen* (Halle, 1909); Cebulla, *Die Stellung adverbialer Bestimmungen in Deutschen* (Breslau, 1910). For editions of the Gothic texts, see the bibliography on ULFILAS.

**GOTHIC LITURGY.** See MOZARABIC LITURGY.

**GOTHIC VERSION.** See BIBLE.

**GOTH'LAND.** See GOTLAND; also GÖTARIKE.

**GOTH'OFRED.** See GODEFROY.

**GOTH'OFRED'US.** See ABELIN, JOHANN PHILIPP.

**GOTHS.** The name of a powerful nation of antiquity, belonging to the Germanic race. By some writers they are thought to have had a Scandinavian origin; this was the belief of their own historian, Jordanes. The earliest notice of them extant among the writers of antiquity is that of Pytheas of Massilles, who lived about the time of Alexander the Great and wrote a book of travels, some fragments of which have been preserved in the works of other writers. In one of these fragments, quoted by Pliny, we find mention made of a tribe of Guttones bordering upon the Germans, and living round a gulf of the sea called Mentomonon, a day's sail from the island of Abalus, where they used to gather amber and sell it to the neighboring Teutones. This gulf, there is every reason to believe, was the Frisches Haff, situated on the Prussian shore of the Baltic. The next notice of the Goths is in the *Germania* of Tacitus (chap. 44), in which they are called Gothones, and are represented as dwelling beyond the Lygii, in the same direction as the one pointed out by Pytheas, though not on the seacoast. Tacitus also distinguishes them from the Gothini, a tribe east of the Quadi and the Marcomanni, and represented by him as using the Gallic tongue. The Gothones, according to this historian, were under regal government and on that account not quite so free as the other tribes of Germany, but still they enjoyed a considerable amount of liberty. The tribes next beyond them, and dwelling immediately on the seacoast, were the Rugii and the Lemovii, whose form of government was also monarchical; their weapons, also, like those of the Gothones, were round shields and short swords.

We next hear of the Goths as settled on the coast of the Black Sea, about the mouths of the Danube, early in the third century. But at what time or under what circumstances their migration from the Baltic to the Euxine took place, it is impossible to ascertain. In their new home, which was also the country of the Getæ (q.v.) (whence, perhaps, the error that confounded them with that people), the Goths increased in both numbers and strength, so that, as early as the reign of Alexander Severus (222-235 A.D.), they made some formidable inroads into the Roman Province of Dacia. In the reign of Philip (244-249 A.D.), they ravaged that province and even advanced to the siege of Marcianopolis in Mœsia Secunda. The inhabitants ransomed their lives and property with a large sum of money, and the invaders withdrew for a time to their own country. Under the Emperor Decius, however, they again entered Mœsia to the number of about 70,000, led by a king named Cniva. Decius himself advanced to meet them and found them before Nicopolis. On his approach they raised the siege and marched away to Philippopolis, a city of Thrace, near the foot of Mount Hæmus. Decius pursued them by forced marches, but the Goths turned with fury upon the Roman legions and utterly defeated them. Philippopolis next fell before them by storm, after a long resistance, during which, and the massacre that followed, 100,000 of its inhabit-

ants are reported to have been slain (260 A.D.). In 251 another tremendous battle took place near an obscure town called Forum Trebonii in Mœsia, in which the Romans were again defeated with great slaughter, the Emperor Decius and his son being in the number of the slain. The succeeding Emperor, Gallus, purchased their retreat by an immediate present of a large sum of money and the promise of an annual tribute for the future. The Goths now set themselves to the acquisition of a fleet, and with this, in 253, advanced to the conquest of Pityus, a Greek town on the northeast coast of the Black Sea, which they completely destroyed. In 258 they besieged and took Trebizond, when a great fleet of ships that were in the port fell into their hands. In these they deposited the booty of the city, which was of immense value, chained the youth of the seacoast to their oars, and returned in triumph to the Kingdom of Bosphorus. In the following year, with a still more powerful force of men and ships, they took Chalcedon, Nicomedia, Nice, Prusa, Apamea, and Cius. In a third expedition, which numbered as many as 500 vessels, they took Cyzicus, then sailed down the Aegean, ravaged the coast of Attica, and in 262 anchored at the Piræus. Athens was now taken and plundered, and many other renowned places in Greece were either partially or wholly destroyed. Even Italy was threatened; but the danger drew the indolent Emperor, Gallienus, from his seclusion. The Emperor appeared in arms, and his presence seems to have checked the ardor and to have divided the strength of the enemy. A portion of the Goths now returned to their own country. But in 269 they again started on a maritime expedition in far greater numbers than ever. After ravaging the coasts of both Europe and Asia, the main armament at length anchored before Thessalonica. In Claudius II, the successor of Gallienus, however, the Goths found a far abler general than any they had yet contended with. This Emperor defeated their host, said to number as many as 300,000 men, in three successive battles, taking or sinking their fleet and, after an immense slaughter of their troops, pursuing such as escaped until they were hemmed in by the passes of Mount Hæmus, where they perished for the most part by famine. This, however, was only a single reverse. Aurelian, the successor of Claudius, was obliged to cede to them, in 272, the large Province of Dacia, after which there was comparative peace between the combatants for about 50 years. In the reign of Constantine, their King, Alaric again provoked hostilities, but was obliged eventually to sue for peace with the master of the Roman Empire. Under Valens they once more encountered the Roman legions, with whom they carried on a war for about three years (367-369) with tolerable success. They now began to be distinguished by the appellations of Ostrogoths and Visigoths, or the Goths of the east and the Goths of the west; the former inhabited the shores of the Black Sea, the latter the Dacian Province and the banks of the Danube. On the irruption of the Huns the Visigoths sought the protection of Valens against those barbarians and in 376 were allowed by him to pass into Mœsia, to the number of about 200,000. Great numbers of them also now took service in the Roman army; but a dispute soon arose between the Goths and their new allies, which led to a decisive battle in 378, near Adrianople, in which the Emperor Valens

lost his life. The Goths now threatened Constantinople, but were not able to take it; and during the reign of Theodosius there was again a period of comparative peace.

Henceforward the history of the Visigoths and that of the Ostrogoths flow in two divergent streams. Before tracing either of these, however, it should be mentioned that the Goths for the most part became converts to Christianity about the middle of the fourth century, adopting the Arian form of belief. Here, also, it may be stated that the term "Mæso-goths" was applied to certain of the western Goths, who, having settled in Mæsia, devoted themselves to agricultural pursuits under the protection of the Roman emperors.

**Visigoths.** Upon the death of Theodosius the Great in 395, and the partition of the Empire between Honorius and Arcadius, the renowned Alaric (q.v.), King of the Visigoths, invaded Greece with an army of his countrymen. His retreat was purchased by giving him a commission to govern Illyricum. In 402 he invaded Italy, took and pillaged Rome (410), and was preparing to carry his arms into Sicily and Africa, when his career was arrested by death. Alaric was succeeded in the sovereignty by ATAVLFUS (q.v.), or ATHAULF (410-415), who, having married Placidia, the sister of Honorius, withdrew from Italy into the south of Gaul, and about 412 crossed the Pyrenees into Spain. Athaulf was assassinated at Barcelona (415), at the instigation of a rival faction of the Goths, and his successor, Sigeric, died the same year. The choice of the Goths now fell on Wallia (415-419), who extended his power over a great part of southern Gaul and Spain and made Toulouse his capital. The Goths under this monarch greatly assisted the Romans in their contests with the Vandals and the Alani. Wallia was succeeded by Theodoric I (419-451), son of the great Alaric. He lost his life fighting on the side of the Romans against Attila (q.v.) at Châlons (see CHÂLONS-SUR-MARNE), leaving the throne to his son, Thorismund (451-453), who, however, was assassinated by his brother THEODORIC II (453-466), who was himself assassinated by his brother Euric (466-483). The reign of Euric was unusually brilliant and successful. He extended the sovereignty of the Visigoths considerably both in France and Spain, introduced the arts of civilization among his subjects, and drew up for their use a code of laws. Under his successors, Alaric II (483-507) and Amalaric (507-531), however, the kingdom of the Visigoths declined before that of the Franks. Alaric II fell by the hands of Clovis (q.v.) in battle, and Amalaric was killed by an assassin. Under the latter's successor, Theudis, the rule of the Visigoths was confined exclusively to Spain. Theudis was in his turn assassinated in his palace at Barcelona in the year 548. It will not be necessary to trace the long line of Visigothic kings that subsequently ruled in Spain from this period down to the year 711. The Visigothic power was completely broken by the Saracen invaders on the battlefield of Jérez de la Frontera. See SPAIN.

**Ostrogoths.** At the coming of the Huns part of the Ostrogoths had been conquered and compelled to lend aid; thus they joined Attila in his renowned expedition against Gaul and fell by thousands under the swords of their kinsmen, the Visigoths, at the battle of Châlons in 451. After this they obtained from the Empire

the right to settle in Pannonia, where they were joined by the other Ostrogoths, who had at the coming of the Huns been admitted within the Roman Empire. In 476 Theodoric (q.v.), the greatest of the Ostrogoth sovereigns, succeeded to the throne upon the death of his father, Theodemir. He directed his arms almost immediately against the Eastern Emperor, Zeno, and, having gained considerable advantages over him, obtained a grant of some of the richest provinces in the Empire. Eventually he was named chief of the Imperial guard and consul for the year 484. In 488, with the consent and advice of Zeno, he planned an immense expedition against Odoacer (q.v.), King in Italy, who had held that position since 476, when he dethroned Romulus Augustulus, the last of the Western emperors. Theodoric utterly defeated Odoacer, slew him, it is said, with his own hand in 493, and reigned undisturbed sovereign of Italy until his death, in 526. The seat of his Empire was at Ravenna, and in 500 he visited Rome, when he convened a meeting of the Senate and declared that it was his intention to rule with evenhanded justice the people committed to his charge. To a great extent he fulfilled this promise and governed his subjects, upon the whole, wisely and to their advantage. The glory of his reign was, however, sullied by the execution of two of the most distinguished men of that age, Boëthius and Symmachus, upon the plea that they were engaged in a conspiracy against him. In the disorders consequent upon the death of Theodoric the Emperor Justinian sought to win back Italy to the allegiance of the emperors of Constantinople; and for this purpose he dispatched Belisarius at the head of an army into that country. In 536 Belisarius entered Rome, which he held for his master, although invited by the Goths to become himself their king; but all his and his successor's efforts to subdue the Goths were at that time utterly fruitless. Totila (541-552), a noble Goth, was elected as successor to Vitiges, the antagonist of Belisarius, but was conquered in the battle of Tagina by the Imperial general Narses in the year 552. In that battle Totila received his death wound and was succeeded by Teias, who did all that a brave man could to repair the misfortunes of his countrymen. It was to no effect, however, for he also was killed in battle in the following year. The Ostrogoths, broken and dispersed by their calamities, henceforward disappear from history as a distinct nation, their throne in Italy being filled by the exarchs of Ravenna; while the nation generally became absorbed in the indiscriminate mass of Alani, Vandals, Burgundians, and Franks, who had from time to time established themselves in the dominions of the old Roman Empire. Consult: Bradley, *The Story of the Goths* (New York, 1888); Hodgkin, *Italy and her Invaders* (Oxford, 1880-99); Bury, *History of the Later Roman Empire* (London, 1889); Gibbon, *Decline and Fall of the Roman Empire* (Bury's ed., 1896-1900); Rappaport, *Die Einfälle der Gothen in das römische Haus* (Leipzig, 1899); Villari, *Le invasioni barbariche in Italia* (Milan, 1901); Martroye, *L'Occident à l'époque byzantine: Goths et Vandales* (Paris, 1903); Cambridge *Medieval History*, vol. i (New York, 1911).

**GOTTLAND**, göt'land, or **GOTHLAND** (Swed. *Gottland*). The largest island in the Baltic Sea, situated about 44 miles off the east coast of

Sweden, and forming, together with the adjacent islets of Fårön and Gotaka Sandön, the Swedish Län of Gotland (Map: Sweden, F 8). Its greatest length is nearly 80 miles, its greatest breadth about 35 miles, and its area 1176 square miles. The surface is level and the soil fertile, while the climate is comparatively mild. A large part of Gotland is under forests, and the arable land constitutes only about one-fifth of the total area. The chief occupations are agriculture and the breeding of live stock. There is a government sheep farm at Roma, in the centre of the island, and the village is the junction for the railroad to the east and west coasts. Sugar beets are extensively grown, and there is a large sugar refinery, while much barley is grown and exported to the breweries on the mainland. There is also some manufacturing of lime, and a number of the inhabitants are engaged in seafaring. There are a number of good harbors, of which Slite Hamn is the most important. Pop. of the län, 1914, 55,488. Chief town Visby (q.v.). The island was in the possession of Sweden as early as the ninth century. In the Middle Ages Visby was an important member of the Hanseatic League. The island was taken several times by Denmark. It came back into the possession of Sweden in 1645. It has strong fortifications.

**GOTSKOWSKI**, göts-köv'skē, JOHANN ERNST. See GÖTZKOWSKI.

**GOTT/BUS**. See COTTBUS.

**GOTTENBURG**, gôt'en-burk. See GÖTEBORG.

**GOTTER**, FRIEDRICH WILHELM (1746-97).

A German poet and dramatist, born at Gotha. He began the study of law, but was early influenced to write for the theatre. While at Wetzlar he became the friend of Goethe. Gotter wrote dramas, lyrics, elegies, tales, and operas. He was the last representative in Germany of the old French taste. Perhaps his best work is *Medea* (1775), for which Benda wrote the music (1778). His complete works were published in 1787, and a posthumous volume, *Litterarischer Nachlass*, in 1802. Consult Schlösser, *F. W. Gotter: sein Leben und seine Werke* (Hamburg, 1894).

**GÖTTERDÄMMERUNG**, gêt'ër-dêm'ër-ung (Ger., Twilight of the Gods). The last of the four divisions of Wagner's music drama, *Der Ring des Nibelungen*. It was first produced on Aug. 17, 1876, at Bayreuth; in the United States Jan. 25, 1888 (New York). Consult W. C. Sawyer, *Teutonic Legends in the Nibelungen Lied and the Nibelungen Ring* (Philadelphia, 1904). See RING OF THE NIBELUNGEN.

**GÖTTERDÄMMERUNG**. See RAGNARÖK.

**GOTTFRIED**, gôt'frēt, JOHANN LUDWIG. See ABELIN.

**GOTTFRIED VON STRASSBURG**, sträs'-börk (c.1200). One of the most brilliant of the German court poets of the thirteenth century. Of his personality very little is known except that he was of good but not noble family, was well educated, and is said to have held some important office, perhaps that of city clerk, in Strassburg. His great poem, *Tristan und Isolde*, written about 1215, is based upon a Celtic legend that reached Germany from France; it was given by Gottfried the form that has widely influenced later literature and furnished Richard Wagner a subject for a great opera. This epic, of 19,554 highly polished verses, gives to the story of fateful, sensual love a tragic force that

is lacking in its French prototype by Thomas, and also in the earlier German epic of like name by Eilhart von Oberge (c.1180). Gottfried left the poem unfinished at the moment when Tristan, parted from Isolt by the jealous husband, King Mark, has withdrawn to Normandy and has vainly sought consolation from another Isolt (of the White Hands). Two efforts to complete the poem were made—one by Ulrich von Türrheim (1236) and one by Heinrich von Freiburg (1300), both unsuccessful. Gottfried is said to have written some lyric poems also and was one of the most widely imitated poets of his day. His style is brilliant, but somewhat florid. W. Golther's edition of *Tristan* in "Deutsche National-Litteratur," vol. iv (Berlin, 1888), and Bechstein's edition (2 vols., Stuttgart, 1881) are useful. Of the translations into modern German that of W. Hertz (2d ed., ib., 1894) is said to be the best. For Gottfried's life, consult Charles Schmidt, *1st Gottfried von Strassburg Strassburger Stadtschreiber gewesen?* (Strassburg, 1876). Consult also: K. F. B. Bergemann, *Das höfische Leben nach Gottfried von Strassburg* (Halle, 1876); Max Heidingsfeld, *Gottfried von Strassburg als Schüler Hartmanns von Aue* (Rostock, 1886); Karl Stiebeling, *Stilistische Untersuchungen über Gottfried von Strassburg* (Leipzig, 1905).

**GOTTHEIL**, gôt'hil, RICHARD JAMES HORATIO (1862- ). An American Semitic scholar. He was born at Manchester, England, but early went to the United States and graduated in 1881 from Columbia College. He studied also at the universities of Berlin, Tübingen, and Leipzig (Ph.D., 1904), and at Jewish institutions in Berlin. At Columbia he lectured on Syriac languages and literature in 1886-87 and was appointed professor of Semitic languages in 1887. In 1896 he became head of the Oriental department of the New York Public Library, and in 1909-10 had charge of the American School of Oriental Research at Jerusalem. From 1898 to 1904 he was president of the American Federation of Zionists, in 1902-03 president of the Society of Biblical Literature, and after 1904 vice president of the American Jewish Historical Society. He wrote many articles on Oriental and Jewish questions for newspapers and reviews, edited the *Columbia University Oriental Series*, and the *Semitic Study Series*, with Morris Jastrow, Jr., was one of the editors of the *Jewish Encyclopædia* after 1901 and a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA, and is author of *The Syriac Grammar of Mar Elna Zobha* (1887), *Selections from the Syriac Julian Romance* (1906), *Zionism* (1914).

**GOTTHELF**, gôt'hêlf, JEREMIAS. The pseudonym of the Swiss author Albert Bitzius (q.v.).

**GOTTI**, gôt'tē, GIROLAMO MARIA (1834-1916). An Italian prelate and Cardinal of the Roman Catholic church. He was born in Genoa, where his father was a dock laborer. He joined the Carmelite Order in 1854 and, showing an unusual bent towards physical science, was made professor of mathematics and natural philosophy in one of their colleges. He was nominated general in 1881. His diplomatic ability caused him to be selected for various special missions to South American states, which he fulfilled with success, especially in Brazil. In 1895 he was created Cardinal, and later Prefect of the Congregation of Bishops and Regulars. In 1902 he was selected, on the death of Cardinal Ledo-

chowski, as Prefect of the Propaganda (q.v.)—a still more important office, practically second in importance and responsibility to the papacy, for the succession to which his name was frequently mentioned.

**GÖTTINGEN**, gē'ting-en. An old town of the Prussian Province of Hanover, situated on the Leine, 36 miles north by rail east of Cassel (Map: Germany, D 3). A canal separates the old town from the new. With the exception of the fourteenth-century Rathaus, containing frescoes by Schaper, the modern theatre, and the famous Göttingen University (q.v.) with a library of 600,000 volumes, the town has no buildings worthy of mention. Of its many educational institutions, the most noteworthy, aside from the university, are the gymnasium, founded at the end of the sixteenth century, the pedagogical seminary, the trade school, the municipal museum of antiquities, and the Anatomie, with the Blumenbach collection of skulls. The Aula has a picture collection with some good examples of the early Dutch and German schools. The chief manufactures are cloth, woolen goods, sugar, chemicals, leather, scientific and musical instruments, tobacco, and famous Bologna sausages. Book publishing is important. Pop., 1900, 30,234; 1910, 37,504.

The town is first mentioned 950-960. It was given municipal rights by Otho IV at the beginning of the thirteenth century and in 1261 became the residence of the princess of Brunswick-Lüneburg. It was a prominent member of the Hanseatic League and famous for its cloth goods. Its prosperity was interrupted by the Thirty Years' War, when it fell twice into the hands of the Swedes. The establishment of the university in 1737 gave Göttingen new importance, and by the end of the eighteenth century it was a flourishing literary centre.

**GÖTTINGEN**, UNIVERSITY OF, or **GEORG-AUGUST UNIVERSITY**. A German university, founded by Georg August, Elector of Hanover, better known as George II of England. It was planned as early as 1732, there being no university in Hanover at that time, and lectures were begun two years later; but the formal foundation dates from 1737. Its organization was the work of the statesman Von Münchhausen, a man of marked ability, who remained in control for many years. Noted teachers, a well-chosen library, a large endowment, and the liberal character of the university soon gave it distinction. The Seven Years' War was a time of depression, but between 1770 and 1790 it was again much frequented. The courses in history, philology, and law were preëminent; in the study of history especially broader and more liberal conceptions prevailed. During the French Revolution and the Napoleonic wars there was another period of depression, followed by renewed prosperity. In 1823 the attendance was greater than it was in 1903; but reverses in 1831 and 1837 brought affairs for a third time under a cloud. During the latter half of the nineteenth century, however, there was a slow and steady growth, due mainly to the excellence of the instruction in mathematics and the natural sciences. The number of students has increased with remarkable rapidity during the present century, reaching 2964 in 1913. There are a large number of laboratories, clinics, seminaries, and the like. The library contains 7381 manuscripts and about 600,000 volumes; for modern books it is probably the richest in Germany. Consult Pütter, Saal-

feld, and Oesterley, *Die Georg-August-Universität* (Göttingen, 1838), and *Chronik der Georg-August-Universität* (Hanover, 1890, and annually since that date).

**GÖTTLING**, gēt'ling, KARL WILHELM (1793-1869). A German philologist, born at Jena. He studied at Jena and later under Wolf, Böckh, and Buttmann at Berlin, and, after holding various minor professorships, was appointed professor extraordinary of philology at Jena in 1822 and full professor in 1832. In 1826 he was made director of the Philological Seminary and university librarian. His chief works are: *Ueber das Geschichtliche im Nibelungenliede* (1814); *Nibelungen und Ghibellinen* (1817); *Allgemeine Lehre vom Accent in der griechischen Sprache* (5th ed., 1835; the original edition was translated as *Elements of Greek Accentuation*, London, 1831); *Geschichte der römischen Staatsverfassung bis auf Cäsars Tod* (1840); *Gesammelte Abhandlungen aus dem klassischen Altertum* (vol. i, 1851; vol. ii 1864); and editions of Aristotle's *Politica* (1824) and *Economica* (1830) and of Hesiod's *Carmina* (3d ed., 1878). His *Opuscula Academica* (1869) were published and edited after his death by Fischer. Consult: *Der Briefwechsel zwischen Goethe und Götting* (Munich, 1880); Nipperdey, *Memoria C. Goettlingii* (Jena, 1869); Lothholz, *Karl Wilhelm Götting* (Stargard, 1876); Fischer, in the preface to the *Opuscula Academica* (Leipzig, 1869).

**GOTTSCHALK**, gôt'shalk, or **FULGENTIUS** (c.805-c.868). A prominent figure in a theological controversy of the ninth century. He was the son of Berno, a Saxon count, and was placed by his parents at an early age in the monastery of Fulda. At the approach of manhood he tried to secure release from his vows, but failed owing to the opposition of his abbot, Rabanus Maurus (q.v.). He was permitted to remove to the monastery of Orbais in the diocese of Soissons and there devoted himself to the writings of St. Augustine and became an enthusiastic believer in the doctrine of predestination, even going beyond his master and holding to a predestination to condemnation as well as to salvation. In 837-838 he went to Italy, partly for the purpose of spreading his views. He was so successful that Bishop Noting called upon Rabanus to assist in suppressing the heretical opinions. In 839 Gottschalk became priest and then had the right to preach. This gave him a great advantage. In 845-848 he was again in Italy, and for two years was the guest of Eberhard, Count of Friuli, till Rabanus, now Archbishop of Mainz, protested. Gottschalk then wandered into Germany, preaching everywhere. Rabanus accused him of neglecting the distinction between foreknowledge and foreordination; on the other hand, he himself refused to recognize any difference between predestination to punishment and predestination to sin. At a synod held in Mainz in 848 and presided over by Rabanus, Gottschalk presented a written explanation in defense of his views; he was, however, very summarily found guilty of heresy and handed over to his ecclesiastical superior, Hincmar of Rheims, to be dealt with as his crime might deserve. He was again condemned in an assembly at Quirey in 849—this time not only as a heretic, but also as a despiser of authority and as a disturber of the Church's peace—deposed from the priesthood and sentenced to be whipped and

rigorously imprisoned. The place selected for his captivity was the monastery of Hautvilliers, in the diocese of Rheims, and here he languished throughout the remainder of his life, a period of 20 years, notwithstanding the efforts of influential friends and his own pitiful appeals. He died Oct. 30, 868 or 869, and was buried in unconsecrated ground. Fragments of his works were published by Migne, *Patrol. Lat.*, cxxi (Paris, 1844-80). The Jansenists (q.v.) renewed interest in him. Consult his life by Borrasch (Thorn, 1868) and Gaudard (Saint-Quentin, 1888).

**GOTTSCHALK**, LOUIS MOREAU (1829-69). A famous American pianist and composer, born at New Orleans, La. At 12 years of age he took up the study of music under Hallé and Stamaty in Paris and from 1845 to 1852 made successful tours of continental Europe. In 1853 he returned to his native land and repeated his foreign successes. He visited most of the important cities and towns from one end of the United States to the other, playing or conducting his own compositions. His success and the hard work entailed undermined his health, and it only needed the fatiguing tour through Cuba and Latin America, commenced in 1865, to hasten his death, which occurred at Rio de Janeiro. His compositions, published and manuscript, covered every branch of music, but his fame as a composer centred in his pianoforte pieces, of which there are about 90. Consult C. Hensel, *Life and Letters of Louis M. Gottschalk* (Boston, 1870).

**GOTTSCHALL**, gôt'shâl, RUDOLPH VON (1823-1909). A German critic and miscellaneous writer. He was born in Breslau and studied at Königsberg, Breslau, and Berlin. His political and social sympathies with the revolutionary movement of 1848 were shown in the dramas *Wiener Immortellen* (1848), *Lambertine von Méricourt* (1850), and *Ferdinand von Schill* (1851), as well as in his first collection of poems, *Gedichte* (1850), and in a lyric epic, *Die Göttin, ein hohes Lied vom Weibe* (1853). From this time on, his work became more serene in temper and style. An epic, *Carlo Zeno* (1854), was followed by a very successful historical comedy (after the style of Scribe), *Pitt und Fow* (1854), and this by literary and historical studies, whose final titles were: *Die deutsche National Litteratur des XIX. Jahrhunderts* (1892) and *Poetik: Die Dichtkunst und ihre Formen* (1858). Noteworthy also are: *Neue Gedichte* (1858); *Mazeppa* (1859); *Reisebilder aus Italien* (1864); *Maja* (1864); *König Pharo* (1872); *Janus*, poems (1873); *Bunte Blüten*, poems (1891). Gottschall's dramas are collected in 12 volumes (1884); his literary essays in *Portraits und Studien* (1870-71), *Litterarische Totenklänge und Lebensfragen* (1885), *Studien zur neuen deutschen Litteratur* (1892), and *Zur Kritik des modernen Dramas* (1900). Of his many novels, the first, *Im Banne des schwarzen Adlers* (1876), is best. Gottschall was also active as an editor and compiler of anthologies.

**GOTTSCHED**, gôt'shët, JOHANN CHRISTOPH (1700-66). A noted German critic and author, who for about 15 years exercised an almost undisputed literary dictatorship in Germany. He was born near Königsberg, Feb. 2, 1700, studied theology and especially philosophy at the University of Königsberg, and in 1724 went to Leipzig, where his lectures on polite literature made

him speedily known, and where he became professor at the university—first of poetry (1730), then of logic and metaphysics (1734). As editor of the weeklies *Die vernünftigen Tadelrinnen* (1725-26) and *Der Biedermann* (1727), modeled after the English, he entered upon his career of untiring critical activity, continued in other literary journals, all tending towards purification of the language and towards conventional forms. In 1726 he was elected senior of the Poetic Society of Leipzig, which he reorganized, and whose influence was considerably extended by him. Directing his criticism at first chiefly against the bombast and absurd affectations of the Second Silesian school, he proceeded to lay down strict laws for the composition of poetry. He was exclusively a man of reason who sought to reduce all rules of rhetoric and poetry to philosophic principles, confining himself, however, strictly to external perception, evidently incapable of fathoming the intrinsic merit of creative genius. Voiced in all his various periodicals and treatises, this tendency was especially apparent in his *Versuch einer kritischen Dichtkunst vor die Deutschen* (1730 and repeatedly after). Here Horace and Boileau were his models. His main endeavor was directed towards the reformation of the German drama, for which he was bent upon creating a national theatre on the model of the French. Aided by his cultured wife, LUISE ADELGUNDE VIKTORIE (1713-62), a prolific writer and translator, and with the coöperation of the theatrical manager Neuber and his wife, Caroline, a clever actress, he succeeded indeed in bringing about a considerable improvement in the condition of the German stage by substituting for the prevailing operatic performances translations of French dramas and original plays, and by banishing from it forever the coarse buffooneries of the "Hanswurst" (Jack Pudding). His own tragedy, *Der sterbende Cato* (1732), fashioned after Addison's and Deschamps's work to serve as a model of what a true tragedy should be, and enthusiastically applauded by Gottsched's faithful followers, is a dreary and stilted production, barren of poetry and dramatic action. Growing ever more vain and dictatorial, and carrying his reforms to pedantic excess, he became involved in a violent controversy with the Swiss critics Bodmer (q.v.) and Breitinger, who advocated the introduction to the German public of the great English writers, especially Milton, and when, in 1748, Gottsched went so far as to belittle the rising genius of Klopstock (q.v.), he drew upon himself ridicule and scathing criticism. The new literary spirit inaugurated by Lessing (q.v.) remained a closed book to him. Long before (1741) he had also fallen out with Caroline Neuber regarding practical stage matters and even placed himself in opposition to his wife. Gradually his influence and authority declined, leaving him embittered and isolated, and thus it came to pass that this worthy man, who in his day had done yeoman service for German literature, became a byword for foolish pedantry years before his death, which occurred at Leipzig, Dec. 12, 1766. But his services to the German language and literature, especially to the drama, are now looked upon with more favor. He left at least one important work, *Nötiger Vorrat zur Geschichte der deutschen dramatischen Dichtung* (1757-65), a valuable, though incomplete, repertory of information intended to embrace an account of all dramatic

productions in Germany from 1450 to 1760. Consult: Danzel, *Gottsched und seine Zeit* (Leipzig, 1848); Fischer, *Gottsched und sein Kampf mit den Schmeizern* (ib., 1892); Wolff, *Gottscheds Stellung im deutschen Bildungsleben* (Kiel, 1895-97); Gottsched's biography by G. Waniek (Leipzig, 1897).

**GÖTZ**, göts, GEORG (1849- ). A German classical scholar, born at Gompertshausen and educated at the University of Leipzig. For two years he was a private tutor in St. Petersburg and from 1875 to 1879 taught in the Russian seminary at Leipzig. He then became professor at Jena. His most important work was in early Latin. He was one of the editors of the "triumvirate" edition of Plautus and edited the *Corpus Glossarum Latinarum* (1888-1903) and Varro's *De Lingua Latina*, with Schoell (1910) and *De Re Rustica* (1911).

**GÖTZ**, HERMANN (1840-76). A gifted German composer, born in Königsberg, Prussia. He did not begin his musical studies until his eighteenth year and from 1860 to 1863 was a pupil at the Stern Conservatory, Berlin, where his teachers were Stern, Von Bülow, and Ulrich. Upon leaving the conservatory he became organist of a church at Winterthur, Switzerland. Götz's place among composers is permanently established by his one opera, *Der Widerspenstigen Zähmung*, first performed at Mannheim on Oct. 11, 1874. In addition to some orchestral and choral compositions he left an unfinished opera, completed by his friend Ernst Frank, called *Francesca von Rimini*. Ill health, brought on by overwork, caused him to retire in 1870 to Hottingen, near Zurich, and he died there, Dec. 3, 1876. Consult A. Steiner, *Herman Götz* (Zurich, 1907).

**GÖTZEN**, göts'en, FRIEDRICH, COUNT (1767-1820). A Prussian general, born at Potsdam. He entered the army in 1783 and was appointed major of cavalry on the general staff in 1801. He had the fullest confidence of King Frederick William III, who appointed him his chief adjutant in 1804, and at whose request he was sent to organize the defense of Silesia. As Governor-General (1807-13) of that province, he displayed extraordinary patriotism during the critical period of the Napoleonic invasion and was chiefly instrumental, by his skill and persistent energy, in saving that province to the Prussian crown.

**GÖTZEN**, GUSTAV ADOLF, COUNT VON (1866-1910). A German traveler, born at the castle of Scharienneck, Silesia. He undertook a journey to the Kilimanjaro, which was highly successful, and on his second tour traversed the entire continent of Africa from Pangani, German East Africa, to the mouth of the Congo. The journey, undertaken in association with Drs. von Prittwitz and Kersting, was begun Dec. 21, 1893, and was terminated, after almost incredible difficulties and hardships, Nov. 20, 1894. The interesting discoveries made by Götz on this tour are described by him in the volume entitled *Durch Afrika von Ost nach West* (1895). In 1896 he was sent to Washington as military and naval attaché, in 1900 was appointed Governor of German East Africa, and from 1901 to 1906 major and commander of the defensive forces there stationed. In 1908 he was Prussian Ambassador to the Hanse Towns.

**GÖTZENBERGER**, göts'en-bërg-ër, JAKOB (1802-66). A German historical painter. He

was born in Heidelberg and studied with Cornelius, first at Düsseldorf, then in Munich. With Förster and Hermann he painted (1832), in the aula of the University at Bonn, the frescoes representing the faculties, for which he had made studies in Rome and Naples in 1828. A cycle in fresco in the chapel at Nierstein, Hesse, made his reputation. He was appointed court painter and inspector of the gallery at Mannheim, visited Paris and London with Cornelius, and in 1844 decorated the Trinkhalle at Baden-Baden with illustrations of the legends of the Black Forest. In 1847 he went to England, where he painted many portraits and some frescoes, of which those in Bridgewater House for Lord Ellesmere and four great compositions after an old English ballad in Northumberland House are the most noteworthy.

**GÖTZKOWSKI**, göts-köv'ské, or **GOTSKOWSKI**, JOHANN ERNST (1710-75). A Prussian merchant and patriot, born at Konitz. In 1730 he removed to Berlin, where, supported by the patronage of the crown, he introduced the manufacture of porcelain in 1761 at the request, it is said, of Frederick the Great. After the battle of Kunersdorf (1759), so damaging to Prussia, he used his influence with the Russian general who was laying siege to Berlin (1760) to guard the city against plundering and to reduce the heavy tribute levied upon the inhabitants, and then paid a large part of it himself. Consult his *Mémoires d'un négociant patriote* (Berlin, 1769).

**GÖTZ VON BERLICHINGEN**, or **GÖTZ OF THE IRON HAND**. See BERLICHINGEN, GÖTZ VON.

**GOUCHER**, JOHN FRANKLIN (1845- ). An American educator, born at Waynesboro, Pa. He graduated from Dickinson College in 1868 (A.M., 1872; LL.D., 1899) and after 1869 held several Methodist Episcopal pastorates in Baltimore. He was president of the Woman's College of Baltimore (now Goucher College) from 1890 to his retirement in 1908. He projected and built several new churches in Baltimore; directed the organization of the Anglo-Japanese College at Tokyo, Japan; helped establish vernacular primary and secondary schools in India; founded the West China and Korean Mission of his church, and made numerous tours of mission and school inspection, especially in the Far East. He was elected president of the board of governors of the West China Union University, Chentu, China, and president of the American Methodist Historical Society. His publications include: *Young People and the World's Evangelization* (1905); *The Sunday School and Missions*; *Christianity and the United States* (1908); *Growth in the Missionary Concept* (1911); *Principles of Stewardship*.

**GOUCHER COLLEGE**. An institution for the higher education of women in Baltimore, Md. Until March 31, 1910, the institution was known as the Woman's College of Baltimore, and was founded in 1844 under the auspices of the Methodist Episcopal church. The name of the college was changed in recognition of the munificent gifts of the Rev. John Franklin Goucher and of his wife, Mrs. Mary Cecilia Goucher, whereby the founding of the college was made possible, and in further recognition of the distinguished services of Dr. Goucher in the organization of the college and its conduct during the presidency beginning Sept. 1, 1890,



and ending June 30, 1908. The college is situated in the north-central part of Baltimore, more than a mile from the nearest business sections. The principal buildings are Goucher Hall, Bennett Hall, and Catherine Hooper Hall. Bennett Hall contains the gymnasium, baths, and swimming pool. There are three dormitories, and the college is provided with laboratories, libraries, and collections for its work. There are several memorial endowments and scholarships for the benefit of the students. The students in 1913-14 numbered 386, of whom 371 were candidates for the degree of A.B. and 15 were unclassified students. Only one degree is given. The faculty and officials of the college numbered 45. The library contains about 12,000 volumes. The productive funds amount to about \$525,000 and the total income to \$75,000. The president in 1914 was William Westley Guth, Ph.D. John F. Goucher, D.D., LL.D., was president emeritus.

**GOUDA**, gou'da (Dutch *Ter Gouw*, on the Gouw). A town of Holland, situated at the confluence of the Gouw and the Yssel, 12½ miles northeast of Rotterdam (Map: Netherlands, C 2). In the market place stand the Late Gothic town hall and the church of St. John, dating from 1485 and restored in 1552, with magnificent stained-glass windows, most of them made by the brothers Crabeth between 1555 and 1577. Gouda has a library located in the church and a museum of antiquities. The chief industries are brick pottery and pipe making, the Gouda pipes having formerly been very famous. Stearin candles are also manufactured here, and an active trade is carried on in dairy products, grain, and especially in the white Gouda cheese, for which the town is famous. The town has also flourishing cigar factories and oil refineries. The canal of Gouda connects Amsterdam with the Lek. Pop., 1889, 19,800; 1910, 29,704.

**GOUDIMEL**, gō'dé'mél', CLAUDE (c.1505-72). A famous French musician and composer of the sixteenth century. About his life little is known beyond the facts that he was born in Besançon, lived in Paris in 1549, and in Metz from 1557 to 1567. On account of his association with Huguenot circles he was supposed to have been a Huguenot himself, especially because of his composition of the version of the Psalms by Marot and De Bèze (in 8 books, 1551-66). Sometime between 1565 and 1568, during the persecution of the Huguenots, Goudimel left Metz, and lived again at Besançon. Shortly before his death he was in Lyons, where, at the time of the Massacre of St. Bartholomew, he lay seriously ill. As a suspected Huguenot he was murdered and his body thrown into the Saône. Brenet has proved beyond a doubt that Goudimel was not (as has generally been believed) the founder of the great school of Rome. It is even doubtful whether he ever visited Italy. His first compositions (32 chansons) appeared in Paris in 1549. He is best known for his magnificent setting of the above-mentioned Psalms, which passed through many editions. His other compositions include several masses, magnificats, motets, and all the Odes of Horace (1555). Consult M. Brenet, *Claude Goudimel, Essai bio-bibliographique* (Besançon, 1898).

**GOUDY**, HENRY (1848- ). A British jurist. He was born in Ireland and was educated at the universities of Glasgow, Edinburgh, and Königsberg. Upon the establishment of the

*Judicial Review* he became its editor and conducted that publication until 1893. He was professor of civil law at Edinburgh from 1889 to 1893, when he was called in the same capacity to Oxford. Besides several contributions to the *Encyclopædia Britannica*, he was coeditor of the *Manual of Local Government in Scotland* (1880) and also edited the second edition of Muirhead's *Private Law of Rome* (1898). His *Treatise on the Law of Bankruptcy in Scotland* (1886; 3d ed., 1903) is regarded as a valuable contribution to that subject. He is author also of *Trichotomy in Roman Law* (1910).

**GOUFFIER**, COMTE DE CHOISEUL. See CHOISEUL-GOUFFIER.

**GOUGE**, gōōj, THOMAS (1609-81). A non-conformist divine and philanthropist, born in London, Sept. 29, 1609, the son of William Gouge (q.v.). He was educated at Eton and Cambridge, and was vicar of St. Sepulchre's, London (1638-62). Here he won distinction by well-directed efforts to provide work for the able-bodied poor. In 1662 he resigned his living because of the Uniformity Act and retired to Hammersmith. In 1672 he began making semi-annual journeys to Wales for the purpose of establishing schools where English should be taught and circulating religious books. He wrote himself several works and numerous tracts, some of which were translated into Welsh. His collected works were published in London (1706). His *Surcest and Safest Way of Thriving* was reprinted, with introduction by Thomas Binney (1856). Consult his biography by Clarke, in *Lives of Eminent Persons* (London, 1683).

**GOUGE**, WILLIAM (1578-1653). A Puritan divine. He was born at Stratford-le-Bow, Middlesex, Dec. 25, 1578; was educated at Eton and Cambridge; became preacher at St. Anne's, Blackfriars, London, in 1608, and continued there till his death, Dec. 12, 1653. He was one of the leading members of the Presbyterian party in England, sat in the Westminster Assembly, and was prolocutor of the first provincial assembly of London in 1647. At college the strictness of his life gained him the name of the "arch Puritan," and later he was affectionately known as the "Father of the London Ministers." As a writer, he is best known by his elaborate *Commentary on the Epistle to the Hebrews* (1655), to which is prefixed a life by Thomas Gouge.

**GOUGES**, gōōzh, OLYMPE DE (1748-93). A pioneer of feminism, born at Montauban in the south of France. Louis XV was reputed her father, but this responsibility should probably be laid at the door of the poet and Marquis Le Franc de Pompignan. Married at 17, Olympe soon left her husband and fled with a rich lover to Paris, where her glowing beauty and eccentric personality made her a figure, and where her "affairs" were numerous, open, and flagrant. After a time, however, she "found the trade of gallantry very ignoble," turned literary, and wrote plays, novels, and endless pamphlets. Her claim to fame rests, however, not on these inartistic productions, but upon her championship of the rights of her sex. She was the first to demand of the Revolution the same rights for women that it gave to men. Her feminism, startling in its modernity, embraces most of the ideas for which "advanced" women strive to-day. It reached its best expression in the pamphlet manifesto, *Declara-*



*tion des droits de la femme et de la citoyenne* (1791), which appeared when Mary Wollstonecraft was in France, and which may have influenced her *Vindication of the Rights of Woman* (1792). Throughout Olympé's career a strain of heroism and idealism blended with frailties and absurdities. A brave offer to defend Louis XVI when his life hung by a thread, followed by attacks she made on men and policies of the hour, brought her to the guillotine in 1793. Consult: Michelet, *Femmes de la Révolution* (Paris, 1854); L. Lacour, *Trois Femmes de la Révolution* (ib., 1900); and for bibliography, J. M. Quérard, *La France littéraire* (12 vols., ib., 1827-64).

**GOUGH**, göf, HUBERT DE LA POER (1870-). An English soldier, educated at Eton and Sandhurst. In 1880 he joined the Sixteenth Lancers, and he saw service in the Tirah expedition in 1897-98 and in South Africa from 1899 to 1902. After commanding the Sixteenth Lancers from 1907 to 1911, he took the command of the Third Cavalry Brigade, with which he was at Curragh, Ireland, in 1914. For services in the European War he was promoted major general in November, 1914.

**GOUGH**, HUGH, VISCOUNT (1779-1869). An eminent British soldier, born at Woodstown, Ireland. He joined the British army in 1794, served at the Cape of Good Hope in 1795 and in the Peninsular War (1809-13), became a major general in 1830, and in 1837 went to India. He commanded the land forces in the Opium War of 1840-42, compelling the Chinese to sign the Peace of Nanking. In 1843, as commander in chief of the forces in India, he routed the Mahrattas at Maharajpur, and for his brilliant victories at Mudki, Pirozshah, Aliwal, and Sohraon in the first Sikh War (1845-46) was given a peerage. In the second Sikh War (1848-49) he was again successful, achieving the victory of Gujarat, following upon an indecisive battle at Chillianwalla; but the heavy losses of the English at Chillianwalla brought criticism upon him, and he was superseded by Sir Charles Napier. Gough was created Viscount and was pensioned in 1849, and in 1862 became field marshal.

**GOUGH**, gáf, JOHN BARTHOLOMEW (1817-86). A well-known American temperance lecturer. He was born in Kent, England, but at the age of 12 went to America as an apprentice and worked on a farm in Oneida Co., N. Y. In 1831 he went to New York City, where he was engaged in bookbinding; but he was soon discharged for habitual drunkenness, and was forced to make a living by giving recitations and singing comic songs in bar rooms. He was married in 1839 and established a shop for bookbinding; but his drunken habits reduced him to poverty and delirium tremens and probably caused the death of his wife and child. A benevolent Quaker induced him in 1842 to take the pledge; and he attended temperance meetings and related his experience with such effect as to influence many others. Some time after signing the pledge he had a short relapse into drunkenness; but an eloquent confession restored him to favor, and he lectured in various parts of America with great success. In 1853 he was engaged by the London Temperance League to lecture two years in the United Kingdom, where he drew large crowds by his earnest and, by turns, amusing and pathetic orations. From this time onward until his death he continued to lecture, for the most part on the question of

temperance, and uniformly drew large crowds. He published: *An Autobiography* (1846); *Orations* (1854); *Temperance Addresses* (1870); *Sunlight and Shadow: or, Gleanings from my Life Work* (1880).

**GOUGH**, göf, RICHARD (1735-1809). An English antiquary, born in London and educated at Cambridge. He was director of the Society of Antiquaries of London from 1771 to 1791. As a result of his extensive travels, he published many works, including: *Anecdotes of British Topography* (1768; enlarged, 2 vols., as *British Topography*, 1780); *Scpulchral Monuments in Great Britain* (3 vols., 1786-99); *A Catalogue of the Coins of Canute, with Specimens* (1777); *Collection of all the Wills of the Kings and Queens of England* (1780); *Coins of the Seleucidae, Kings of Syria* (1803); *Antiquities and Memoirs of the Parish of Ulyddle* (1833). Noteworthy also is his excellent edition of Camden's *Britannia* (3d ed., 3 vols., 1806), which embodies the results of explorations extending over a period of more than 20 years.

**GOUIN**, gö'ün', SIR (JEAN) LOMER (1862-). A Canadian lawyer and statesman. He was born at Grondines, Province of Quebec, and was educated at Sorel and Lévis colleges and at Laval University. Called to the bar in 1884, he early became distinguished as a lawyer. In 1891 he was an unsuccessful Liberal candidate for the House of Commons, but he was elected to the Provincial Legislature in 1897; in 1900-04 he was Commissioner of Public Works in the Liberal administration of Simon Napoleon Parent, and after 1905 he was Premier and Attorney-General. He was chairman of the Interprovincial Conference held in Ottawa in 1906 and a delegate to the Interprovincial Conference there in 1910; edited a special edition of the Quebec Municipal Code; in 1907 was made an officer of the Legion of Honor, in 1908 was knighted during the Quebec centenary celebration, and in 1910 was elected *bâtonnier-general* of the provincial bar.

**GOUJON**, gö'zhön', JEAN (1520-c.68). The greatest sculptor of the Renaissance in France. He was also an architect, although, as he always worked in conjunction with great architects, it is not possible now to determine how much of the architecture of his works belongs to him. The leading quality of his work is its architectonic quality—the absolute harmony which prevails between it and the architecture which it adorns. But, as sculpture pure and simple, it is of a high order, showing a lofty, but at the same time a free, realization of the antique, coupled with a wholesome naturalism and a fine feeling for style. His figures show a peculiar flavor of preciousness characteristic of the period and his personality.

Goujon's origin is entirely unknown. A contract for two columns supporting the organ of the church of Saint-Maclon at Rouen, dated Aug. 9, 1541, bears his name and points to Normandy as his native country. In the porch of this church are two carved wooden doors of great beauty, which are definitely in the style of Goujon, although there is no proof that they were made by him. A record of 1542 ascribes to him the statue of the Archbishop Georges II d'Amboise on the monument of the Cardinal Georges I d'Amboise in the cathedral of Rouen. When the Archbishop became Cardinal, this statue was replaced by the present one. It has been conjectured that Goujon was also employed

on the monument to Louis de Brézé in the cathedral.

Goujon's long association with the great architect Pierre Lescot begins about 1541, when they accomplished together the restoration of the church of Saint-Germain-l'Auxerrois in Paris. Two of the bas-reliefs have been preserved in the Museum of the Louvre. Goujon was employed in 1545-46 by the Constable de Montmorency in the decoration of his château at Ecouen. The bas-reliefs of the Hôtel Carnavalet are ascribed to the year 1547. Goujon erected an extraordinary loggia with fountains at the corner of the old Cemetery of the Innocents in the Rue aux Fers, Paris. When the cemetery was discontinued (June 19, 1786), this charming work, bas-reliefs of the nymphs of the French rivers, was rearranged in a public square, and is still called the Fountain of the Innocents. Probably about 1550 to 1553 Goujon was employed at the château of Arrêt, under Philibert de l'Orme. The fine group of Diana and a stag which decorated one of the courts of this château is now in the Museum of the Louvre. From 1546 until the end of his life Goujon was associated with Pierre Lescot in the construction and decoration of that portion of the Louvre which was built by Henry II at the southwestern angle of the old Louvre quadrangle. The figures on the sides of the round windows are notable. The most beautiful and important part of his work on the Louvre is the gallery for musicians, which stands in the hall now occupied by a part of the Museum of Antiquities. The four caryatides which support this gallery have been compared with the caryatides of the Erechtheion at Athens. The date of the last one is Sept. 6, 1562. Goujon, like many of the great artists of his day, was a Huguenot and he may, like other coreligionists, have been dismissed from the royal service that year. The tradition that he was killed in the Massacre of St Bartholomew (Aug. 24, 1572) has been completely disproved. From the testimony of a French Protestant interrogated before the Inquisition at Bologna in 1568, it appears that Goujon lived in exile at Bologna from c.1563 and died between that time and 1568.

**Bibliography.** For reproductions of his work, see *Œuvre de Jean Goujon* (Paris, 1844), text by Pottier; and his biography by Vitry (ib., 1908) and Lister (London, 1903); Gonsse, *La sculpture française depuis le XIV<sup>ème</sup> siècle* (Paris, 1895); Palustre, *La renaissance en France*, vol. ii (ib., 1881); Lami, *Dictionnaire des sculpteurs de l'école française* (ib., 1898); and Montaignon, "Jean Goujon et la vérité sur la date de sa mort," in *Gazette des Beaux-Arts*, vols. xxx-xxxi (ib., 1884-85).

**GOULBURN**, göl'būrn. An episcopal city in New South Wales, Australia, 134 miles southwest of Sydney, on the left bank of the Wollondilly River, and on the Great Southern Railroad (Map: Australasia, G 6). Gold and copper are found near by, and there are tanneries, boot and shoe factories, flour mills, and breweries; but the main business of the region is agriculture. The city, which stands at an elevation of 2129 feet above sea level, is well-built; it possesses an Anglican and a Roman Catholic cathedral, both attractive buildings, and owns its gas and water works. Pop., 1901, 10,680; 1911, 10,900.

**GOULBURN, HENRY** (1784-1856). An English statesman. He was born in London, was

educated at Trinity College, Cambridge, and entered Parliament for Horsham in 1808. Four years later he became Undersecretary for War and the Colonies, and was one of the peace commissioners at the close of the war with the United States (1814). His further political appointments were: member of the Privy Council and Secretary to the Lord Lieutenant of Ireland (1821); Chancellor of the Exchequer under the Duke of Wellington (1828); Home Secretary (1835); and Chancellor of the Exchequer in the cabinet of his intimate friend Sir Robert Peel (1841). He retired from the government in 1846, but represented Cambridge University in Parliament until his death.

**GOULD**, göld, AUGUSTUS ADDISON (1805-66). An American zoölogist, born at New Ipswich, N. H., April 23, 1805. He graduated at Harvard in 1825, and took his medical degree five years later. He was an instructor in botany and zoölogy at Harvard for two years, and practiced medicine in Boston. He was one of the leading conchologists of his time, and was one of the most active naturalists in America. He published: *System of Natural History* (1833); *The Invertebrate Animals of Massachusetts* (1841); *Principles of Zoology*, with L. Agassiz (1848).

**GOULD**, BENJAMIN APTHORP (1787-1859). An American educator, born at Lancaster, Mass. He graduated at Harvard in 1814, and was principal of the Boston Latin School from that time until 1828, when the failure of his health compelled him to resign. He prepared for the school several textbooks, including *Adams's Latin Grammar* (1825) and editions of Latin classics.

**GOULD**, BENJAMIN APTHORP (1824-96). An American astronomer, born in Boston, Mass. He graduated at Harvard in 1844, and received the degree of Ph.D. from Göttingen in 1848, established the *Astronomical Journal* in 1849, continued it until 1861, and resumed its publication in 1885. In 1852 he was appointed director of the longitude determinations of the Coast Survey, and in 1867, after having organized and greatly developed this service, retired. From 1855 to 1859 he was director of the Dudley Observatory, at Albany, N. Y., and in 1866 established, by means of the Atlantic cable, the relations in longitude between American and European stations. From 1865 he was much interested in the study of the southern celestial hemisphere, and in 1870 established at Córdoba, Argentina, the National Observatory, where he accumulated the material for his *Uranometria Argentina* (1874) and *Catálogo de zonas estelares* (1884), both classic in the literature of astronomy. In 1872, with the assistance of the Argentine government, he further established a system of meteorological stations extending southward to Tierra del Fuego and eastward to the Atlantic. He returned to the United States in 1885. He was a charter member of the National Academy of Sciences, was elected president of the American Association for the Advancement of Science in 1868, and was the recipient of many foreign distinctions. His contributions to the scientific knowledge of the southern celestial hemisphere must be regarded as having marked an epoch in the modern study of astronomy.

**GOULD**, EDWIN (1866- ). An American capitalist, son of Jay Gould and brother of Helen Miller Gould Shepard, George Jay, Howard, and Frank Jay Gould. Born in New York

City, he studied for a time at Columbia College. He was chosen a captain in the Seventy-first Regiment of the State National Guard. He served as secretary of the St. Louis, Arkansas, and Texas Railway from 1888 until it was reorganized as the St. Louis and Southwestern in 1891, and afterward as vice president and president. He organized the Continental Match Company in 1894 (consolidated with the Diamond Match Company in 1899); was president of the Bowling Green Trust Company until it was merged in the Equitable Trust Company; and became vice president of the American Writing Paper Company, president of the Five Boroughs Realty Company, and director in many railroad and other corporations.

**GOULD, SIR FRANCIS CARRUTHERS** (1844- ). An English caricaturist, born in Barnstaple, the son of an architect. He became a bank clerk and then a member of the London Stock Exchange, where his amusing portraits of members directed attention to him. An ardent Liberal, he used his gift as a caricaturist for political purposes in the *Pall Mall Gazette* from 1887 until 1892, when it became a Conservative paper, and then (1893) in the *Westminster Gazette*, of which he became assistant editor in 1895 and towards the success of which he contributed greatly. Principally for his work on the *Westminster Gazette*, he was knighted in 1906. From 1879 on he usually contributed to the Christmas number of *Truth*, sometimes in colors. He published *Who Killed Cock Robin?* (1897), *Tales Told in the Zoo* (1900), *Froussant's Modern Politics* (1900-02), and the annual *Westminster Cartoons* (1895-1905).

**GOULD, GEORGE JAY** (1864- ). An American capitalist, born in New York City, the eldest son of Jay Gould. He was privately educated, and afterward assumed control of large railway interests. In 1888 he became president of the Little Rock and Fort Smith Railway; in 1893 of the St. Louis, Iron Mountain, and Southern, the International and Great Northern, and the Missouri Pacific. From 1892 to 1913 he was president of the Manhattan Elevated Railway of New York City, and he also became director of many other railroad companies.

**GOULD, HANNAH FLAGG** (1789-1865). An American author, born at Lancaster, Mass. She wrote extensively for magazines and newspapers, and some of her verses were at one time very popular. They are simple and pleasing, with a decided moral tone. A volume of her poems appeared in 1832, a second in 1836, and a third in 1850. Among her other works are: *Gathered Leaves*, prose sketches (1846); *The Diosma*, composed partly of original and partly of selected poems (1851); *The Youth's Coronal* (1851); *The Mother's Dream* (1853); *Hymns and Poems for Children* (1854).

**GOULD, HELEN MILLER.** See SHEPARD, HELEN MILLER GOULD.

**GOULD, JAMES** (1770-1838). An American jurist, born in Branford, Conn. He graduated at Yale in 1791, was admitted to the bar in 1798, and thereafter almost continuously until 1833 was connected with the famous Litchfield Law School (see REEVE, TAPPING), first as professor, and from 1820 to 1833 as superintendent. From 1816 to 1818 he was a justice of the Connecticut Supreme Court. He published *A Treatise on the Principles of Pleading in Civil Actions* (1832; 6th ed., ed. by F. F. Heard, 1909).

**GOULD, JAY** (1836-92). An American capitalist, born in Roxbury, Delaware Co., N. Y. He passed his boyhood on his father's farm and was educated at Hobart Academy. In 1852 he entered a hardware store which his father had established; but although he did not neglect the business, his evenings were devoted to the study of surveying, at which he spent the years from 1852 to 1856, preparing and publishing maps of Albany and Delaware counties, of various counties in Ohio and Michigan, and of a proposed railway from Newburg to Syracuse. In 1856 he published a *History of Delaware County*. In the same year he engaged in the lumber and tanning business in western New York, selling out just before the panic of 1857 and removing to Stroudsburg, Pa., where he became the controlling director in a small bank. It was shortly after this that he first became interested in railroading. In the great financial depression following the panic of 1857 he disposed of his bank stock and bought a controlling interest in the Rutland and Washington Railroad running from Troy, N. Y., to Rutland, Vt., for 10 cents on the dollar. Of this company he became president, treasurer, and general manager, and subsequently brought about a consolidation of his road and the Rensselaer and Saratoga Railroad. In 1859 he sold out his stock in the consolidated roads at 120, and removed to New York, where he embarked in the brokerage business. He made a special study of railway stocks and set out to obtain control of the Erie Railroad, then in financial straits, and the object of strife between the Drew and Vanderbilt interests. By methods new in railway speculation, Gould secured control of the road, and in 1868 was elected its president. His administration of the road may, as he asserted, have reclaimed it from bankruptcy, but it saddled it with a debt of \$64,000,000 and resulted in its paying no dividends until 1891. The manipulation of the Erie was the first of a long series of speculations by which Gould obtained the mastery of some of the greatest railway corporations in the country. His method of obtaining control was the same in almost every instance to depress the value of the stock which he sought to control and acquire the property during the period of depression. By these methods in the next few years he obtained control of the Union Pacific, which he held from 1873 to 1883, during which time the value of its stock rose from 15 to 75; of the Missouri Pacific, which under his management and by consolidation and extension developed from a short line 287 miles long with earnings of \$280,000 a month to an immense system with earnings, before his death, stated at \$5,100,000 a month; of the Wabash, the Texas Pacific, the St. Louis and Northern, and the St. Louis and San Francisco. In 1880 he controlled fully 10,000 miles of road, more than one-ninth of the mileage of the country. Gould also consolidated competing telegraph lines into the Western Union system in 1881 and obtained control of the Manhattan Elevated Railroad in the same year. What has been considered the most indefensible of all his actions was his entering with "Jim" Fisk, who was also his partner in some of his railroad deals, into a scheme to corner the gold market, which resulted in the disastrous "Black Friday" panic of 1869.

**GOULD, JOHN** (1804-81). An English ornithologist, born at Lyme Regis. In 1827 he was

appointed taxidermist to the Zoölogical Society of London. In 1832 he published his *Century of Birds from the Himalayan Mountains*, based on a collection of bird skins obtained from that region, and containing 80 plates from drawings by himself. He was elected a fellow of the Royal Society in 1843. His works include 40 other volumes, with careful plates. The most important of them are *The Birds of Australia* (7 vols., 1840-48), with 601 plates, material for which was largely collected on a scientific journey to that continent and the adjacent islands; a *Monograph of the Trochilidae* (humming birds) (1849-61), with 360 plates; and *The Birds of Great Britain* (5 vols., 1862-73), with 367 plates. His Australian birds are in the Academy of Natural Sciences of Philadelphia.

**GOULD, SABINE BARING.** See **BARING-GOULD, SABINE.**

**GOULD, THOMAS R.** (1818-81). An American sculptor, born in Boston. He was at first a merchant and did not adopt sculpture as a profession until after the Civil War. He practiced in Boston until 1868, when he established a studio in Florence, Italy. Among his works are ideal busts of "Christ" and "Satan"; the "West Wind," Mercantile Library, St. Louis; portrait busts of Emerson, John A. Andrew, and the elder Booth; a statue of John Hancock in the town hall of Lexington; a colossal bronze statue of King Kamehameha I, Honolulu; "A Puritan" on Cambridge (Mass.) Common, completed by his son. Although a man of fine culture and true personal worth, he was deficient in technical training and real sculptural feeling. Consult Tuckerman, *Book of the Artists* (New York, 1867).

**GOULDING, gōŏl'ding, FRANCIS ROBERT** (1810-81). An American author. He was born at Roswell, Ga., and was educated at the University of Georgia and at the Presbyterian Theological Seminary, Columbia, S. C. His story for boys, *Robert and Harold, or the Young Marooners on the Florida Coast*, first published in 1852, became very popular. His other stories include: *Marooner's Island* (1868); *Frank Gordon* (1869); *Woodruff Stories* (1870).

**GOUNOD, gōŏn'ô, CHARLES FRANÇOIS** (1818-93). A distinguished French composer of sacred and dramatic music. He was born in Paris, June 17, 1818, the son of an eminent painter and engraver, who died in 1823, leaving his widow and family in comparative poverty. In his autobiographical *Memoirs*, published in 1895, Gounod ascribes all his artistic success to the training and influence of his mother, who was a woman of remarkable character as well as an accomplished musician. At 18 he entered the Paris Conservatory, where his masters were Reicha, Halévy, Lesueur, and Paër, and at the end of his first year he won the second Prix de Rome with the cantata *Marie Stuart et Rizzio*. In 1839 he won the Grand Prix de Rome with the cantata *Fernand*. His first appointment was as organist and precentor of the Missions Etrangères, Paris, where for five years little was heard of him until portions of a *Messe Solennelle*, produced at one of Hullah's concerts in London in 1851, attracted general attention. In the same year he made his début as an operatic composer with *Sappho*. Although not a success, the work earned for its composer a solid reputation. *Ulysse* followed in 1852, shortly after his marriage to a

daughter of Zimmerman, a professor at the Conservatory. He became superintendent of instruction in singing to the communal schools of Paris, and also director of the choral society connected with them, succeeding Hubert, the original founder of the society. The experience gained in this employment was of inestimable value to him, in that he learned to direct and utilize large masses of vocal sound so as to develop the mechanism of sonority, under very simple methods of treatment. *La nonne sanglante*, an opera in five acts, written in 1852, presented in 1854, and performed only eight times, was his next work, its failure proving a great disappointment to him. In 1856 he made the acquaintance of Barbier and Carré, who agreed to supply the libretto of *Faust*; but by the time it was half finished a difficulty arose which precluded an immediate presentation, and Carvalho, who was to stage the new opera, asked that instead Gounod would write a comic opera, taking the subject from Molière. *Le médecin malgré lui* (1858) was accordingly written, its success being immediate and complete. A melodrama, *Faust*, had meanwhile been given at a rival theatre with but little success, and the collaborators returned to their work on their own half-finished opera of *Faust*, which was produced March 19, 1859. It did not meet with immediate approval, but has subsequently come to be regarded as the composer's operatic masterpiece and still holds its place as one of the most popular operas. *Roméo et Juliette* (1867) is, however, regarded by French critical opinion as of greater musical value than *Faust*. Smaller and less successful compositions were the following: *Philémon et Baucis* (1860); *La Colombe* (1866); *La reine de Saba* (1862); *Mireille* (1864). His sojourn in England during the Franco-German War was as profitable to him as it was beneficial to the cause of music in England. He formed the Gounod Choir, a choral society of mixed voices, which gave very successful concerts. To this period belong *Gallia*, a small cantata of enduring merit, and the *entracte* music to several stage productions. His great oratorios, *The Redemption* (1882) and *Mors et Vita* (1885), are standard. Of his five masses the most beautiful and famous is the St. Cecilia (1882). In 1896 his *Mémoires d'un artiste* (which end with the year 1859) appeared posthumously. The most comprehensive biography is that by J. G. Prod'homme, *Gounod: Sa vie et ses œuvres* (2 vols., Paris, 1911). Consult also: H. Tolhurst, *Gounod* (New York, 1904); P. L. Hillemacher, *Gounod* (Paris, 1905); H. Imbert, *Charles Gounod* (ib., 1907); C. Bellaigue, *Gounod* (ib., 1910).

**GOUPIL, ADOLPHE** (1806-93). The founder of the famous French art firm of Goupil et Cie. (now Manzi, Joyant et Cie.). He started in Paris in 1827 as a dealer in copperplate engravings, but before long acquired a plant and began to publish prints as well as sell them. Among the many French artists whose paintings were reproduced are Delaroche and Ary Scheffer. Later the processes of photogravure and of color printing were added, and the principal pictures of each year's Salon were thus multiplied. Illustrated works, books of patterns, and study sheets for painters and designers were also published. The firm has branches in New York, Berlin, and The Hague.

**GOUR.** See **GAUR.**

**GOURA**, gōō'rā (Neo-Lat., from the native name). A genus of remarkable fruit-eating pigeons, by far the largest of the family, and natives of Java, New Guinea, and other islands of the Indian Archipelago. The best known (*Goura coronata*) is 2 feet 4 inches in length and is a very beautiful bird, of a grayish-blue color, with parts of the back and wings black and purplish brown and with a broad white bar across the wings. The head is adorned with a large semicircular crest of narrow straight silky feathers, always carried erect. Gouras are in the highest esteem for the table, but attempts to introduce them into the poultry yards of Holland have completely failed. Seven or eight forms are known. They have become rare on account of continued persecution, their crests being much in demand by milliners. See Plate of PIGEONS.

**GOURAMI**, gōō'rā-mi (Javanese name). An excellent fish (*Osphromenus olfax*), native in the rivers and brackish waters of China and the East Indian Archipelago, which has a deep oval, compressed body, large scales, and long dorsal and anal fins. The first ray of the ventral fins is prolonged backward as a long filament. The fish grows 3 to 5 feet long, though the usual size averages below this, and is greenish brown obscurely banded with vertical stripes. It is one of the nest-building fishes and at the breeding season forms its nest by entangling the stems and leaves of aquatic grasses. Both the male and female watch the nest for a month or more with careful vigilance and violently drive away every other fish which approaches, till the spawn is hatched, afterward affording a similar parental protection to the young fry.

This fish is usually regarded as the best table fish of Eastern waters and has been artificially cultivated for a long period in tanks, etc., by the Malays and Dutch of the East Indies. It is hardy and omnivorous and was long ago carried to India, Mauritius, Australia, and even to the French West Indies, thriving well in all these places and multiplying in the local streams.

**GOURD**, gōrd or gōōrd (Fr. *gourde*, Portug. *cougourdo*, It. *cucurza*, from Lat. *cucurbita*, gourd). The name "gourd," or its equivalent, as employed in Europe includes squashes and pumpkins, but in America it is confined largely to the inedible hard-shelled fruits of certain members of the family Cucurbitaceæ. The more common American gourds are *Lagenaria vulgaris* and some small egg and pear shaped ornamental fruits belonging to *Cucurbita pepo*, var. *ovifera*. The former is a rampant climbing vine, which finds considerable use as a cover for unsightly places. On account of their shapes the fruits are frequently used for dippers, bottles, or dishes, after their contents have been removed and they have been soaked to get rid of the bitter principle. The Luffa (vegetable sponge), or dishcloth gourd (*Luffa cylindrica*), has recently come into prominence in America. The young fruit is edible and the fibrous interior of the dried fruit, when properly prepared, is used as a bath sponge. It also makes a durable dishcloth. These and smaller ornamental gourds are all of the easiest culture, requiring about the same treatment as do squashes. See BOTTLE GOURD; CALABASH GOURD; CUCUMBER. See Plate of CUCUMBER ALLIES.

**GOURD FAMILY**. See CUCURBITACEÆ.

**GOURDSEED**. A local name in the Western

United States for the Missouri or black-horse sucker (*Cyloleptus elongatus*). See SUCKER, BLACK HORSE.

**GOURGAUD**, gōōr'gō', GASPARD, BARON (1783-1852). A French general, born at Versailles. After serving with distinction in the various campaigns of Napoleon from 1805 until 1813, he was appointed his adjutant general and later given the title of Baron. He accompanied Napoleon to St. Helena, but was compelled for political reasons to leave the island in 1818, after he had assisted Napoleon in preparing his *Mémoires*. In 1832 he became aide-camp to Louis Philippe and in 1841 was appointed to the House of Peers. His principal publications are: *La campagne de 1815* (1818); *Mémoires pour servir à l'histoire de France sous Napoléon, écrits à Sainte Hélène sous la dictée de l'empereur* (8 vols., 1822-24); *Réputation de la vie de Napoléon par Sir Walter Scott* (2 vols., 1827); *Journal de Ste. Hélène* (1899).

**GOURGUES**, gōōrg, DOMINIQUE DE (1530-93). A French soldier and adventurer, born in Mont-de-Marsan, Gascony. In his youth he served in Italy with the French armies under Maréchal de Strozzi and in 1557 was captured by the Spanish at Siena. He was condemned to the galleys, where he was still serving, two years later, when his ship was captured by the Turks. The change of masters brought no immediate relief, and he was still kept at the oar, until the vessel fell in turn into the hands of the Knights of Malta, by whom he was set at liberty. His rough life had bred in him a love of adventure, and in the next few years voyages to Africa, to Brazil, and other far-off regions increased his experience and won for him renown as a leader of men and a sailor. He returned to France at a time when the blood of all Frenchmen and of French Huguenots in particular was stirred by the report that the year before (1565), although France and Spain were at peace, Menendez (q.v.) and a Spanish force had descended upon the French Huguenot settlement of Jean Ribault at Fort Caroline on the Florida coast, had massacred the greater part of the colonists, and had afterward hung a large body of Ribault's followers under a placard, which read, "Not as to Frenchmen, but as to Heretics." Gourgues planned to wreak vengeance with his own hands. He sold his family estate, borrowed all the money he could, and fitted out three small ships, manned with 80 sailors and 150 arquebusiers, for the ostensible purpose of kidnaping negroes in Africa. Sailing in August, 1567, to the coast of Benin (Africa), he secured a cargo of negroes with which he sailed across the Atlantic, and which he sold to the Spaniards in the West Indies. He landed near the mouth of the St. John's River, on which Fort San Mateo stood, and found willing allies in Chief Satouriona and his tribe of Indians, who had suffered much at the hands of Menendez. Gourgues and his allies descended at once on the two small forts which the Spanish had built at the entrance of the St. John's, and after destroying their garrisons attacked Fort San Mateo itself the next day. Such of the Spaniards as had not been killed in the assault were hung on the very trees upon which they had hung their captors' fellow countrymen, and over their heads was placed a pine board, whereon was written, "Not as to Spaniards, but as to Traitors, Robbers, and Murderers." The fortifica-

tions were razed, and Gourgues set sail for France, arriving at La Rochelle on June 8, 1568, where he was received with honor and rejoicing. He is probably the author of *Reprise de la Floride*, the best edition of which is by Tamizey de Larroque (Paris, 1857). Consult: Basanier, *L'Histoire notable de la Floride* (Paris, 1586), which was translated and published by Hakluyt (London, 1587) as *Notable History* and reprinted in French's *Historical Collections of Louisiana and Florida* (New York, 1869); also Parkman, *Pioneers of France in the New World* (Boston, 1903); Gaffarel, *Histoire de la Floride française* (Paris, 1876).

**GOURKO**, gōr'kō, OSSIP VLADIMIROVITCH. See GURKO.

**GOURLAY**, ROBERT FLEMING (1784-1863). A Canadian statistician and political reformer, born in Fifeshire, Scotland. He devoted much study to statistics and economic subjects, and on the basis of his report on the condition of the British poor a measure passed the House of Commons, but was rejected by the Lords. In 1817 he came to Upper Canada, where the political dominance of the Family Compact and the ecclesiastical privileges of the Anglican church had caused widespread discontent. (See CANADA, *History*; POLITICAL PARTIES, *Canada*.) Gourlay, who sided with the popular party, called a convention through which to present the public grievances before the British government. This made him a marked man. When tried for sedition, at Kingston and at Brockville, he was acquitted, but ordered to leave Upper Canada. He refused, and in 1819 was imprisoned in the jail at Niagara, where he remained so long and under such privation that his health was seriously injured. He was found guilty of disobeying the order of banishment, was compelled to quit the country, and, after residing for some time in the United States, went to England. In 1836 the sentence against him was nullified, his imprisonment declared illegal, and he was granted a pension, which he declined. He came again to Canada, but eventually went to reside in Edinburgh, where he died. He wrote a number of able political pamphlets, but his most important work was a *Statistical Account of Upper Canada* (1822).

**GOURMONT**, gōr'mōn', RÉMY DE (1858-1915). A French scholar, born at Bazoches-en-Houlme (Orne). In 1883 he obtained a position at the Bibliothèque Nationale, but lost it (1891) on account of a radical article which displeased the government, *Le joujou: patriotisme* (The Plaything: Patriotism). A profound scholar and an aristocrat by temperament, he was strangely won over to the blunt naturalism of his friend Huysmans and the symbolism of Gérard de Nerval and Mallarmé, whose contentions he continued to uphold, especially in matters of literary style. His unimpeachable sincerity and distrust of second-hand information, together with a constant contact with modern French writers of the most advanced schools, make him, if not always an impartial critic, at least a frequently reliable authority on the literature of the day. In this respect he is second only to Anatole France (q.v.). He came to be at the head of a most important periodical, *Le Mercure de France*. Of his many publications, the following are the most typical: *Le Français au Canada* (1888), *Prose moroses* (1896), *Le pèlerin du silence* (1896), which contains one of the

gems of French symbolist prose poetry; *Le livre des masques* (1896-98); *Promenades littéraires* (1904-06) and *Promenades philosophiques* (1906-08), which contain a comprehensive view of the latest products in their respective fields; *Des divertissements* (1912), a volume of poetry. Consult: P. de Querlon, *Rémy de Gourmont* (Paris, 1903); J. Huneker, *The Pathos of Instance* (New York, 1913); A. Ransome, *Portraits and Speculations* (London, 1913).

**GOURNAY**, gōr'nā', JACQUES CLAUDE MARIE VINCENT DE (1712-59). A French administrator and political economist, born at Saint-Malo. He was the son of a wholesale merchant, and at an early age became a partner in a mercantile firm established in Cadiz. As a representative of the firm, he traveled extensively in Spain, Germany, England, and Holland, and acquired a wide knowledge of commercial practice and policy. In 1751 he purchased the administrative post of Inspector of Trade in Paris, from which he retired in 1758. Gournay was a man of inquiring turn of mind and early became convinced of the irrationality of the restrictive commercial policy then pursued by France. Familiar with the writings of the liberal mercantilists of England and Holland, he sought to popularize their work in France. He exercised a considerable influence over a group of ambitious young men in the civil service, of whom Turgot (q.v.) later rose to distinction. Although the popularization of the phrase, "Laissez faire, laissez passer" was attributed to Gournay by the later Physiocrats, he was far from an acceptance of the absolute free-trade ideas of the Physiocratic school. He is properly to be regarded as a moderate protectionist, with interest directed towards the development of industry rather than of agriculture. His influence upon the development of economic doctrine, which was considerable, was exerted chiefly through oral tradition. His writings are scant and of no especial importance.

**GOURNIA**, gōr'nī-ā. A town in the eastern part of Crete, 60 miles east of Candia, in a valley leading to a sheltered bay on the northern coast. The name, derived from the shape of the valley, signifies "trough" or "basin." Though not mentioned in ancient writers, this town was long an important centre of Minoan civilization. Later, about 1500, it was completely destroyed. Excavations were conducted on its site in 1901, 1903, 1904, by Mrs. Harriet Boyd Hawes (Miss Harriet A. Boyd). At the top of the hill on which the town lay, where the rock had been largely denuded, many of the best objects in bronze and terra cotta were found within 2 feet of the surface; lower down the hill the town had been buried to a depth of 15 feet or more. The culture represented at Gournia dates in the main from 1700 to 1500 B.C., though many of the objects found belong to much earlier times. The ground plan of houses can be clearly made out; indeed, upper walls of fire-baked brick resting on stone bases and traces of staircases have been found. Paved roads, too, were laid bare; so also a market place. In the houses was found "much the most varied and comprehensive apparatus of Minoan domestic economy available for study, and nowhere else is better revealed what high artistic aim and achievement went with restricted provincial means in that remote age." See CRETE, *History*; ARCHAEOLOGY, I, *The Pre-Mycenaean or Minoan Period*, and, II, *Mycenaean Period*. Consult: Burrows, *The*

*Discoveries in Crete* (London, 1907); C. H. Hawes and H. B. Hawes, *Crete, the Forerunner of Greece*, especially 88-102 (London, 1909), with plan; H. B. Hawes and others, *Gournia, Vasiliki, and other Preliminary Sites on the Isthmus of Hierapetra, Crete* (Philadelphia, 1908), a richly illustrated work.

**GOUROFF**, гоу'роф', real name JARDY DUGOUR (1766-1840). A Franco-Russian author. He was born at Clermont-Ferrand, of Russian extraction. After acting as director of the Collège de la Flèche until the outbreak of the Revolution, he went to Russia, where he adopted the name of Gouroff, and successively became professor at Kharkov and St. Petersburg. His literary productions include: *Mémoire justificatif pour Louis XVI* (1792-93); *Mémoires sur les Tatars Nogais* (1816); *De l'influence des lumières sur la condition des peuples* (1826); and *Essai sur l'histoire des enfants trouvés depuis les temps les plus anciens jusqu'à nos jours*, an interesting work later embodied in the publication entitled *Recherches sur les enfants trouvés*, etc. (1829), which contains statistics on illegitimacy in Europe, Asia, and America.

**GOUSAT**, гоу'сá', EDOUARD JEAN BAPTISTE (1858- ). A French mathematician, born at Lanzac, Lot, France, and educated at the Collège de Brive, the Lycée Henri IV, and the Ecole Normale Supérieure. He was instructor in the faculty of science, Paris (1879-81) and Toulouse (1881-85); from 1885 to 1889 was chief lecturer in mathematics at the Ecole Normale Supérieure; and became in 1896 a tutor at the Ecole Polytechnique and in 1897 professor of differential and integral calculus at the Sorbonne. He obtained the grand prize of mathematical science in 1886, the Poncelet prize in 1889, and the Petit d'Ormy prize in 1891. He also became a Chevalier of the Legion of Honor and an officer of public instruction. His works include: *Leçons sur l'intégration des équations aux dérivées partielles du premier ordre* (1891; Ger. trans. by Maser, 1893); *Leçons sur l'intégration des équations aux dérivées partielles du second ordre à deux variables indépendantes* (2 vols., 1896-98); *Théorie des fonctions algébriques et de leurs intégrales*, with Appell (1895); *Cours d'analyse mathématique* (2 vols., 1902-05; 2d ed., 3 vols., 1910-13; Eng. trans. of vol. i by E. R. Hedrick, 1905); "Equations non linéaires du premier ordre" in *Encyclopédie des sciences mathématiques* (1913).

**GOURVILLE**, гоу'вél', JEAN HÉRAULT DE (1625-1703). A French political agent and adventurer, born at La Rochefoucauld. He entered the service of the Abbé de la Rochefoucauld, went to Paris with him, and there became secretary to the Prince de Marsillac (1646). From that time he was deep in all the political intrigues of the day, sometimes being in the pay of both sides. During the wars of the Fronde he attached himself particularly to Condé. By various means he had enriched himself considerably, so that when condemned to lose his fortune through confiscation after the fall of Fouquet, he escaped to England, and finally settled in Brussels. In 1667 he was able to be of service to France at the Congress of Breda, and afterward was employed in political missions until he obtained the official pardon necessary before he could return to court in 1690. The last years of his life were spent in the best literary society of the time. He left some *Mémoires* (2 vols., 1894-95).

**GOUT** (from OF. *goute*, *goutte*, It. *gota*, drop, gout, from Lat. *gutta*, drop); **PODAGRA**. A term first used by Rадalphus in the thirteenth century, who taught that gout was caused by a humor that flowed drop by drop into the joints. The numerous references to the disorder, not only in the medical writings of Hippocrates, Galen, Aretaeus, Caelius, Aurelianus, and the later Greek physicians, but in such purely literary works as those of Lucian, Seneca, Ovid, and Pliny, show not only the frequency, but the notoriety of the disease. It is caricatured by Lucian in his burlesque of *Tragopodagra* in language quite applicable to the disease as now observed; while the connection of it with the advance of luxury in Rome is recognized by Seneca in the remark that in his day even the women had become gouty, thus setting at naught the authority of physicians, who had asserted the slight liability of women to gout. Pliny likewise remarks upon the increase of gout, even within his own time. Ovid and Lucian represent the disease as mostly incurable by medicine; from this view Pliny dissents. The list of quack remedies given by Lucian is one of the most curious relics of antiquity. Gout is both a local disorder and a general perversion of nutrition. Consequent upon imperfect oxidation, there is found an excessive formation of uric acid, fats, and fatty acids, instead of water, carbonic acid, and urea. Sometimes there is an excess of unoxidized sugar. The disease is a special manifestation of a tendency called the arthritic diathesis. (See DIATHESIS.) Baldness, pityriasis, acne, eczema, urticaria, prurigo, asthma, catarrhal inflammations of the mucous membranes, varicose veins, hemorrhoids, and neuralgia are often resultants of the same perversion of nutrition that in some cases manifests itself as gout. Iritis and irido-choroiditis are the most common of the gouty inflammations of the eye. The external and middle ear, too, suffer from gout. Biliary lithiasis, visceral calculi, diabetes, obesity, hemierania, and arthritis deformans are among the morbid affinities of gout. The malady is to some extent hereditary, and in some gouty families functional nervous diseases are very common among the descendants (especially the females) of gouty ancestors. But diet and mode of life are far more potent factors than heredity in its causation. Some families ascribe to heredity diseases that are actually due to living under the same faulty conditions of hygiene and dietetics, whereby a morbid predisposition becomes established. Gout has disappeared from many localities in Europe step by step with the growth of temperance and the acquisition of hygienic knowledge.

Acute gout, however, followed by uratic deposits in the joints, is frequently transmitted in families. It is almost always a disease of adult age. Women are far less liable to acute gout than men. The character of food largely determines the amount of urea and uric acid produced in the body, and nitrogenous food is provocative of gout. Active muscular exercise and avoidance of grief or anger, or disturbance of psychic balance, are valuable preventives of attacks, even in those who inherit the gouty tendency. Change of season favors gouty outbreaks, the spring and autumn furnishing a large proportion of cases. Climate is a determining, though not decisive, cause. The free perspiration induced in warm countries is a safeguard against gout. Workers in lead,



plumbers, painters, enamelers, and tanners are especially liable to be attacked by gout, various observers finding lead poisoning a factor in from 15 (Osler) to 33 per cent of cases.

Pathologically, gout is characterized by the presence of an excessive amount of uric acid in the blood and the deposition of uric-acid salts in the tissues. The most common seat of deposits is the articular cartilage of the first joint of the great toe, but other articular cartilages may also be involved, as may also the cartilages of the eyelids, larynx, and ears, and the ligaments of joints. The deposit incrusts or infiltrates the cartilage, and if ulceration of the overlying skin takes place, may appear on the surface as the so-called "chalkstones." According to Ebstein, the primary changes in the joints are those of a local necrosis due to the excess of urates in the blood. Sclerotic conditions in the arteries and kidneys are quite common, and deposits of urates in the latter may occur. Hypertrophy of the heart is often associated with the arterial changes. As to the cause of the accumulation of urates in the system in gout we are uncertain. It may be due to defective elimination of urates or to local conditions which favor their deposition. A typical attack of acute gout presents the following symptoms: After some weeks of previous indigestion, attended with flatulent swelling and a feeling of weight, the patient goes to bed free from pain, and having had rather an unnaturally strong appetite the day before. In the middle of the night he is awakened by a pain in the great toe, or sometimes in the heel, the ankle, or the calf of the leg. The pain resembles that of a dislocated bone, and is accompanied by a sense as if water not perfectly cold were poured over the affected limb; to this succeeds chilliness, with shivering and slight fever, these last symptoms diminishing as the pain increases. From hour to hour, until the next evening, the patient suffers every variety of torture in every separate joint of the affected limb; the pain being of a tearing, or crushing, or gnawing character, the tenderness such that even the weight of the bedclothes, or the shaking of the room from a person's walking about in it, is unbearable. The next night is one of tossing and turning, the uneasy limb being constantly moved about to find a better position; till towards morning the victim feels sudden relief, and falls over into a sleep, from which he wakes refreshed, to find the limb swollen, the venous distention usually present in the early stage having been succeeded by a more general form of swelling, often with itching between the toes, and a peeling off of the cuticle. This individual attack may be repeated many times in the course of what is termed "a fit of the gout," which commonly extends over a period of weeks, or even months, before the patient is completely relieved; or the attacks may occur in both limbs, or in several other parts of the body in succession, the real termination of the "fit" being at last indicated by an apparently complete restoration of health, and even, in some cases, by a period of improved condition and capacity for exertion, as compared with the state of the patient before the attack. In this form, acute gout might almost be called a local disease; although the connection of the attacks with deranged digestion, or with the other morbid affinities already described, and the obvious relief obtained after a sharp attack, from the

symptoms of constitutional suffering, point to a cause of the disease operating over a larger range of functions than those included in the local manifestations at this period.

The joints which have been repeatedly the seat of the regular paroxysm become more or less permanently crippled and distorted. The patient is laid up more or less permanently; and exercise, the great natural specific remedy of the gouty, is rendered impossible. Then follow aggravations of all the constitutional troubles. Indigestion continues or becomes constant, assuming the form chiefly of acidity after meals; the liver becomes torpid, the abdomen corpulent, the bowels constipated; the kidneys fail to perform their functions satisfactorily, and not infrequently there is a tendency to gravel and calculus (q.v.); the heart is affected with palpitations, or fainting occurs, sometimes with spasmodic attacks of pain; the arteries become the seat of calcareous deposits, and the veins are varicose in the limbs and in the neighborhood of the rectum (see PILES); the temper is singularly irritable, and often morose; sooner or later the appetite fails or is only kept up by very stimulating and unwholesome diet, with an excess of wine or of alcoholic liquors; in the end, the body emaciates, and premature old age supervenes. Sometimes the end is sudden, as by cerebral hemorrhage, uræmia, dropsy from the heart condition, or gouty kidney (interstitial nephritis). Uric acid in a certain excess has been shown by Garrod, and subsequently by Alexander Haig, to be characteristic of the blood of the gouty, although a minute amount of this substance is probably present even in perfect health. The most recent speculations, accordingly, tend to connect the gouty predisposition either with an excessive formation or a checked excretion of this important substance, the product of the vital distintegration of flesh and other food, after these have subverted the wants of the system. The cure of gout demands the careful consideration of all its predisposing causes in the individual, and the strict regulation of the whole life and habits accordingly, from the earliest possible period. The amount of meat food and sugar must be lessened, and milk and vegetables must constitute the diet. In old people, fruit acids should be avoided, wine and malt liquors absolutely prohibited, and large quantities of pure water imbibed. In some cases very small quantities of distilled spirits do not harm a patient who is taking no nitrogenous food but milk. Tea, coffee, and cocoa are forbidden.

Exercise in the open air facilitates interstitial oxidation, and improves excretion. Mountain climbing benefits many. Cold sponge baths, with brisk friction from a rough towel thereafter, are desirable, unless reaction be feeble. In the latter case warm baths are indicated. The bath should be taken in the morning and the patient should return to bed for an hour at least. For certain patients dry, hot-air baths, Turkish or Russian baths are desirable; to others, sea baths are beneficial.

Medicinal treatment consists in the intelligent use of alkalies, salicylates, and benzoates, mineral acids, purgatives, mineral waters, colchicum, lithium salts, piperazine, mercurials, iodides, quinine, antipyrin, guaiac, and certain other drugs. There is no routine treatment for the disease; the patient must be studied and treated according to the nature of the case.